COASTAL MONITORING PROJECT 2004-2006

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EXECUTIVE SUMMARY

The Irish coastline, including the islands, extends to 6,000 kilometres, of which approximately 750 kilometres is sandy. The sand dune resource is under threat from a number of impacts – primarily natural erosion, changes in agricultural practices and development of land for housing, tourism and recreational purposes. This project, carried out on behalf of the National Parks and Wildlife Service (NPWS), is designed to meet Ireland's obligation under Article 17 of the EU Habitats Directive, in relation to reporting on the conservation status of Annex I sand dune habitats in Ireland. The following habitats were assessed:

1210 – Annual vegetation of driftlines
1220 – Perennial vegetation of stony banks
2110 – Embryonic shifting dunes
2120 – Shifting dunes along the shoreline with *Ammophila arenaria*
2130 – Fixed coastal dunes with herbaceous vegetation (grey dunes)
2140 – Decalcified fixed dunes with *Empetrum nigrum*
2150 – Atlantic decalcified fixed dunes (Calluno-Ulicetea)
2170 – Dunes with *Salix repens* ssp. *argentea* (Salicion arenariea)
2190 – Humid dune slacks
21A0 – Machairs

The project is notable in that it represents the first comprehensive assessments of sand dune systems and their habitats in Ireland. Over the course of the three field seasons (2004-2006), all known sites for sand dunes in Ireland were assessed (only 4 sites were not visited owing to access problems). The original inventory of sand dune systems by Curtis (1991a) listed 168 sites for the Republic of Ireland. During the current survey, analysis of aerial orthophotographs and additional information supplied by NPWS staff increased the site list to 181 sites. In addition, 15 sub-sites are recognised on the basis that they are geographically isolated from the main site and are subject to different management regimes.

Detailed site reports provide a clearer understanding of the habitat area, processes and impacts and the conservation status of the sand dune habitats at individual sites. These site reports are located in Volume II of this report. In addition, all of the results have been entered into a Coastal Monitoring Project database, which will enable a convenient method of accessing specific data.

The overall condition of each habitat was determined following a methodology that was adapted from the Joint Nature Conservancy Council – Common Standards Monitoring (CSM) guidance documents. The specific attributes that determine the conservation status of a habitat at a site are (a) Habitat extent (area), (b) Structure and Functions and (c) Future Prospects. Habitat area is based on survey work using GPS, examination of aerial photographs and the production of detailed GIS maps. Structure and Functions was determined from monitoring stops that were carried out in all habitats and at most sites. Future Prospects are based on apparent impacts/threats to the site or a particular habitat that are likely to occur in the future. Each of these attributes are assigned either a 'Favourable', 'Unfavourable-Inadequate' or 'Unfavourable-Bad' rating, using criteria outlined in chapter 2. The final Conservation Status is a synthesis of all the collected data, none of which should be

used isolation. It is derived using the least favourable attribute. In addition, the overall conservation assessment of habitat takes into account the overall range of the habitat within a biogeographical region.

A summary of the number of sites achieving each overall conservation status rating for each habitat is provided below.

Number of Sites

Habitat Names	Total no. of Sites	Favourable	Unfavourable-inadequate	Unfavourable-bad
Decalcified fixed dunes with *Empetrum nigrum* (2140)	4	3	1	0
Annual vegetation of driftlines (1210)	71	46	25	0
Perennial vegetation of stony banks (1220)	47	26	20	1
Embryonic shifting dunes (2110)	116	38	51	27
Shifting dunes along the shoreline with *Ammophila arenaria* (2120)	141	27	60	54
Fixed coastal dunes with herbaceous vegetation (2130)	152	20	89	43
Atlantic decalcified fixed dunes (2150)	7	4	3	0
Dunes with *Salix repens* ssp. *argentea* (2170)	17	8	9	0
Humid dune slacks (2190)	64	21	33	10
Machairs (21A0)	59	6	35	18

The overall conservation status rating is determined by a combination of the assessments for Range, Habitat area/extent, Structure and Functions, as well as Future Prospects. A summary of the ratings achieved by each habitat in each category is provided in the table below, where green = Favourable, amber = Unfavourable-Inadequate and red = Unfavourable-Bad.

Range

Although a number of new sites were recorded for certain habitats, while others were declassified, these changes did not have a significant impact on the range of any particular habitat. Furthermore, as this is predominantly a baseline survey, it is assumed that habitat range is stable and so this attribute is considered to be favourable for all habitats.

Habitat area/extent

Previous estimates for the extent and distribution of a number of habitats were found to be inaccurate, partly due to mapping errors and misclassification of the vegetation. In many cases, this made it difficult to ascertain if there was an actual loss or gain in the current survey. With the exception of decalcified dunes with *Empetrum nigrum* (which were *favourable*) and mobile dunes (which were *unfavourable-bad*), the area of all habitats are all considered to be *unfavourable-inadequate*, indicating that there has been some loss of habitat. A standard mathematical formula was applied to the data to estimate habitat loss, except where losses could be quantified e.g. loss of habitat to a golf course development.

National Overview of Conservation Assessments

Habitat Names	Range	Area	Structure and Functions	Future Prospects	**Overall**
Decalcified fixed dunes with *Empetrum nigrum* (2140)					
Annual vegetation of driftlines (1210)					
Perennial vegetation of stony banks (1220)					
Embryonic shifting dunes (2110)					
Shifting dunes along the shoreline with *Ammophila arenaria* (2120)					
Fixed coastal dunes with herbaceous vegetation (2130)					
Atlantic decalcified fixed dunes (2150)					
Dunes with *Salix repens* ssp. *argentea* (2170)					
Humid dune slacks (2190)					
Machairs (21A0)					

Structure and Functions

While most coastal habitats are naturally dynamic, a functioning coastal ecosystem must have the capacity to adapt to pressures, both natural and anthropogenic. Overall, only the decalcified fixed dunes with *Empetrum nigrum* and annual vegetation of driftlines were assessed as *favourable* for structure and functions, indicating that the natural process for this habitat are functioning unhindered. At all other sites, this attribute is considered *unfavourable-inadequate* or *unfavourable-bad* in the case of mobile dunes, fixed dunes and machairs, indicating human impacts, such as land use and management, along with either overgrazing or undergrazing are negatively impacting on the habitats.

Future Prospects

For six of the habitats assessed during this survey, the future prospects have been rated as *unfavourable-inadequate*, the remainder being assessed as *unfavourable-bad*, which is largely due to ongoing negative impacts which are likely to continue into the future. The main reasons appear to be restructuring of land holdings and agricultural improvement, overgrazing, and general recreation. These negative impacts, coupled with natural erosion, which although considered to have a neutral impact, are likely to continue into the future and active management will be required to remedy the situation in order to achieve favourable conservation status.

Overall Conservation Assessment

The national overview of sand dune habitats highlights the worrying fact that the overall conservation assessment in 6 of the 10 habitats is *unfavourable-inadequate*, while the remaining four are rated as *unfavourable-bad*, including two of the priority dune habitats.

The following conclusions can be made regarding the overall findings at each habitat, which are arranged in order of best conservation status to worst.

- **Decalcified fixed dunes with *Empetrum nigrum* (2140)** was recorded from 4 sites in Donegal. It is estimated that the habitat covers 2.85ha, which is significantly lower than the 245.01ha reported in the NATURA 2000 database. The reason for this discrepancy is partly owing to misidentification of the habitat in earlier surveys (e.g. *Empetrum* was present, but was not growing on sand), its occurrence within complex mosaics of vegetation and more accurate mapping. The overall conservation assessment for this habitat is *unfavourable-inadequate*. Issues relating to habitat characteristics and demarcation - in terms of other similar "heath"-like habitats were not resolved during the current project and will require additional research. Despite these difficulties, 3 sites (or 99% of the total habitat area) were rated as *favourable*, while the last, small site accounts for 1% *unfavourable-inadequate* overall conservation assessment in terms of area. Future work is needed to clearly define, describe and develop a management strategy for this habitat in Ireland.

- **Annual vegetation of driftlines (1210)** was recorded from a total of 71 sites and occupied an area of 52.16ha. There has been an estimated loss of 0.6% or 0.31ha of the total habitat area since 1996 primarily due to natural erosion, pedestrian traffic and the construction of sea-defences, which alter the movement of and deposition of organic debris. Where present, the habitat structure and functions were assessed as *favourable*. A total of 46 of the 71 sites (or 65%) were in *favourable* conservation status. This accounts for 66% of the total habitat area. The remainder of the habitat was rated as *unfavourable-inadequate*. In terms of the national overview, the habitat is rated as *unfavourable-inadequate.*

- **Perennial vegetation of stony banks (1220)** was only recorded from sand dune systems associated with the current survey. This habitat is far more widespread in its overall distribution and the results should be treated accordingly. 49% of the habitat area associated with sand dunes is rated as *favourable* while 51% is *unfavourable-inadequate*. A single site in Donegal (Mountcharles) is rated *unfavourable-bad* and accounts for less than 1% of the total area of the habitat. This poor result was largely due to dumping of rubble at the site. The overall conservation status for the habitat is *unfavourable-inadequate*, which is largely due to the increasing number of man-made structures – coastal protection works that are being installed. These are likely to impact on the natural mobility of the substrate in the future.

- **Embryonic Shifting dunes (2110)** were estimated to occupy 171.5ha and were recorded from 118 sites. Although embryonic dunes are susceptible to removal by storms or high tides, the loss of habitat was estimated to be 4.8ha or 2.72% of the habitat area over the past 10 years. 91% of the habitat is considered to be funtioning naturally. The overall conservation assessment for the habitat is *unfavourable-inadequate*.

- **Atlantic decalcified fixed dunes (Calluno-Ulicetea) (2150)** was confirmed at 7 of the 11 sites that have been designated for this habitat – 1 on the East coast and the remainder in Mayo and Donegal. The current area is estimated at 77.81ha,

with some losses reported from Brittas Bay since 1996. Based on floristic criteria and project-determined constraints, its presence was not confirmed at Magherabeg, Kilpatrick, Ballyteige Burrow and Inchydoney. More research is needed to clearly define the characteristics of this habitat in Ireland. However, in the absence of well-defined criteria and targets, structure and functions, future prospects and overall conservation assessments have provisionally been rated as *unfavourable-inadequate*.

- **Dunes with *Salix repens* ssp. *argentea* (Salicion arenariea) (2170)** was recorded from a total of 17 sites in 5 counties. The extent of the habitat is currently 118ha. There has been an approximate loss of 0.5ha since 1996. It should be noted that there is an inherent difficulty in characterising the habitat, particularly as it often occurs in an intimate mosaic with both humid dune slacks and fixed dunes. The primary impacts/threats are largely associated with agricultural management. Although a reasonable level of grazing is required to ensure a healthy habitat, both undergrazing and overgrazing were noted. Other impacts include the location of supplemental feeders in these areas. Owing to the level of regular occurrence of these impacts, the overall conservation assessment for the habitat is *unfavourable-inadequate*.

- **Humid dune slacks (2190)** were recorded from 64 sites (211.5ha). It is estimated that there has been a relatively small loss of area (0.5ha), which corresponds to a loss of 0.23% over a 10-year period. The overall conservation status of dune slacks recorded throughout Ireland is *unfavourable-bad*. This is largely due to a number of impacts including grazing pressures, recreational activities and water abstraction in particular. Although it was outside the project capabilities to quantify the lowering of the water-table, its occurrence was noted at a number of sites, notably around existing golf links and also in areas where the development of land for housing can alter the local hydrological regime e.g. Brittas Bay.

- **Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)** were estimated to cover 7060.58ha. This priority habitat occupies the largest area of all Annex I sand dune habitats in Ireland. It is widespread and was recorded at 152 sites. In general, the habitat was found to be in poor condition with little in *favourable* overall conservation status – only 20% of both the overall area of the habitat and of sites. It is estimated that there has been a loss of 232.6ha or 3.2% over the past 10 years, largely due to undergrazing, agricultural management and the development of land for various purposes such as housing and recreation. Less than 20% of sites are rated as *favourable*. Therefore the overall conservation assessment is *unfavourable-bad*.

- **Machairs (21A0),** the priority Annex I habitat, is estimated to occupy 2752.6ha. It was recorded from 59 sites in counties Galway, Mayo, Sligo and Donegal. Like fixed dunes, machair represents a generally stable grassland habitat where agricultural or amenity management may dominate large areas of habitat. Since 1996, there has been an estimated loss of 66.4ha or 2.35% of the total habitat, primarily due to restructuring of land holdings and agricultural improvement, overgrazing and general recreation. 10% of sites or 6% (156.76ha) of the total habitat area was considered of *favourable* conservation status. 62% (1704.38ha) of the total area of the habitat is rated as *unfavourable-inadequate*, while 32%

(891.60ha) is in worse condition and is rated as *unfavourable-bad*. The overall conservation assessment, however, for the habitat is *unfavourable-bad*, owing to the failure of the structure and functions attribute at 33.6% of sites. This is indicative of the considerable changes in farming practices which has seen many machair commonages being fenced (stripped) resulting in greater concentration of livestock in confined areas, overgrazing, supplementary feeding and poaching of the land.

- **Shifting dunes along the shoreline with *Ammophila arenaria* (2120)** was recorded from a total of 141 sites and covered approximately 405.65ha. The overall conservation assessment for the habitat in terms of the national resource is *unfavourable-bad*, as only 19% of sites (27) or 131.08ha is considered to be in a *favourable* status, while 38% of sites or 20% (76.63ha) of the total habitat area is *unfavourable-bad*. Extent is rated as *unfavourable-bad*, as there has been an estimated loss of 89.2ha of habitat, which represents a decrease of 18% since 1996. This figure is misleading, and does not portray the habitat dynamic, nor the fact that accretion was noted at a number of sites such as Bull Island, Cahore Point North, Kilmuckridge, Fermoyle sub-site and Dooey. The future prospects are considered *unfavourable-bad*, owing to the ongoing threats from natural erosion and recreational pressures. Therefore, the overall conservation assessment is *unfavourable-bad*.

In terms of the overall National resource, all sand dune habitats recorded in Ireland are failing to achieve a favourable conservation status. The condition of the sand dune habitats is far from encouraging, as 6 out of the 10 sand dune habitats were assessed as *unfavourable-inadequate*, while the remaining 4 were *unfavourable-bad*, including two of the Annex I priority habitats (fixed dunes and machair). Two other priority habitats (dunes with *Empetrum nigrum* and decalcified fixed dunes) were assessed as *unfavourable-inadequate* in the current survey, although more work is needed to accurately determine the current and potential status of these habitats in Ireland. The conclusion to be drawn from the results of this survey is clear. The management regimes that are in place for various sand dune systems and their various habitats, in terms of maintaining or improving their ecological condition, as required under the EU Habitats Directive, are largely unsatisfactory. It is unlikely that there will be any great change in these assessments in future monitoring periods, unless structured management plans are developed and implemented in order to achieve favourable conservation status.

Disclaimer

Please note that the views expressed and conclusions drawn in this report are solely those of the authors and should not be inferred to represent the views of NPWS.

FOREWORD

The project was carried out in three phases, with site visits conducted in the field seasons of 2004, 2005 and 2006. All fieldwork in 2004 and 2005, which encompassed the east coast sites from Louth to Wexford, and the south and south-west coast sites from Waterford to Kerry respectively, was carried out by Tim Ryle, Kieran Connolly and Anne Murray. Fieldwork in the final project phase in 2006, incorporating all sites from Clare to Donegal, was carried out by Kieran Connolly (KC), Anne Murray (AM), Tim Ryle (TR), Mairéad Gabbett (MG) and Melinda Swann (MS). Additional fieldwork assistance in 2006 was provided by Amanda Browne (AB) and Mark McCorry (MMcC).

The schedule of fieldwork and report writing is summarised below

Project Phase	**Counties**	**Number of sites surveyed**	**Fieldwork**	**Site Reports**
2004	Louth, Meath, Dublin, Wicklow, Wexford	44	TR, KC, AM	TR, KC, AM
2005	Waterford, Cork, Kerry	36	TR, KC, AM	TR, KC, AM
2006	Clare, Galway, Mayo, Sligo, Donegal	101	KC, AM, MS, TR, MG, AB, MMcC	KC, AM, TR, MS

Site reports for all three phases of the project were written by Tim Ryle, Kieran Connolly and Anne Murray, while Melinda Swann also wrote site reports in the 3rd phase of the project. All other parts of the report were written by Anne Murray, Kieran Connolly and Tim Ryle.

The project was overseen by members of the Research Division of the National Parks and Wildlife Service (NPWS) at the Department of the Environment, Heritage and Local Government.

A Safety Statement detailing a risk assessment of working in coastal sites and methods for minimising risks to personnel was submitted as part of the contract requirements. Fieldwork was carried out in accordance with strictures laid down in this statement.

Vascular plant names in this report follow those of Stace (1997); Bryophytes follow Smith (2004).

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GLOSSARY

Accretion – the accumulation of sediment on the coast.

Annex I - of the EU Habitats Directive, lists habitats including priority habitats for which SACs have to be designated.

Attribute – the characteristic of a particular feature, in the CSM protocol, that describes its condition either directly or indirectly, for example, sward height in a fixed dune area. An attribute must be measurable so that targets can be set as part of the conservation objective of the feature.

Blowout - the removal of sand from a dune by the wind after protective dune vegetation has been lost.

Common Standards Monitoring (CSM) – the methodology developed by the JNCC for monitoring nature conservation in terms of habitats and species.

Community - a well-defined assemblage of plants and/or animals, clearly distinguishable from other such assemblages.

Conservation status - The sum of the influences acting on a habitat and its typical species that may affect its long term distribution, structure and functions. Also refers to the long-term survival of its typical species within the European territory of the Member States.

DEHLG - Department of Environment, Heritage and Local Government.

Ecology - the study of the interactions between organisms, and their physical, chemical and biological environment.

Encroachment - The invasion of a species (usually plants) into areas previously uncolonised. This term is often used when an undesirable species advances at the expense of a desirable species or habitat.

Favourable Conservation Status - the conservation status of a natural habitat is favourable when: its natural range and areas it covers within that range are stable or increasing, and the specific structure and functions which are necessary for its long term maintenance exist and are likely to continue to exist for the foreseeable future, and the conservation status of its typical species is favourable.

Favourable Reference Area - total surface area in a given biogeographical region considered the minimum necessary to ensure the long-term viability of the habitat type; this should include necessary areas for restoration or development for those habitat types for which the present coverage is not sufficient to ensure long-term viability. Favourable reference value must be at least the surface area when the Habitats Directive (92/43 EEC) came into force.

Favourable Reference Range - Range within which all significant ecological variations of the habitat/species are included for a given biogeographical region and

which is sufficiently large to allow the long term survival of the habitat/species. Favourable reference value must be at least the range (in size and configuration) when the Habitats Directive (92/43 EEC) came into force.

Gabions – wire mesh cages containing rocks used in coastal protection works.

Geographic Information Systems (GIS) - a computer based mapping package which facilitates the digital design and manipulation of numerous layers or themes of information for on-screen display and editing or for printing.

Global Positioning System (GPS) - is based on satellite ranging. It determines a location/position on earth by measuring the distance from a group of reference satellites in space.

Groynes - low walls, usually of wood or rock, built perpendicular to the shore intended to trap sediment drifting along the shoreline.

Habitat - refers to the environment defined by specific abiotic and biotic factors, in which a species lives at any stage of its biological cycle. In general terms it is a species home. In the Habitats Directive this term is used more loosely to mean plant communities and areas to be given protection.

Habitats Directive (Council Directive 92/43/EEC) – the Directive on the conservation of Natural Habitats and of Wild Flora and Fauna. This Directive seeks to legally protect wildlife and its habitats. It was transposed into Irish legislation by the EU (Natural Habitats) Regulations, 1997.

Hydrology - The movement of water through a catchment area including freshwater and seawater inputs, water level changes and drainage mechanisms, which are all influenced by the underlying geology.

Intertidal zone – the area between the mean high and low water marks.

Joint Nature Conservancy Council (JNCC) – the legislative agency in Great Britain that is tasked amongst other things with establishing a common standards for monitoring nature conservation.

Monitoring – A repeat or repeats of a survey using the same methodology. Designed to look for or measure specific changes and the rate or extent of change. Used to check the “health” quantity or quality of a habitat or species.

National Parks and Wildife Service (NPWS) – The section of the Environment Infrastructure and Services division of the Department of Environment, Heritage and Local Government with responsibility for nature conservation and implementation of Government conservation policy.

Natural Range – The spatial limits within which the habitat or species occurs.

National Vegetation Classification (NVC) - a comprehensive and systematic account of the vegetation types of Britain, including natural, semi-natural and major artificial habitats.

Nourishment, beach – the supply of sediment by artificial means to supplement sand on an existing beach or to build up an eroded beach.

Ortho-Rectified Image – The 2000 Ordnance Survey flight colour images were used as part of this project. These images were used in TIF format and were ortho-rectified. These images have been used as base data to identify the location of raised bogs, produce the high bog boundaries and vegetation maps.

pNHAs - proposed Natural Heritage Areas. These are areas that are important for wildlife conservation. Some of these sites are small, such as roosting areas for rare bats; others can be large such as a blanket bog or a sand dune system.

Priority Habitat - a subset of the habitats listed in Annex I of the EU Habitats Directive. These are habitats which are in danger of disappearance and whose natural range mainly falls within the territory of the European Union. These habitats are of the highest conservation status and require measures to ensure that their favourable conservation status is maintained.

Revetment – a mound of rock, concrete, etc., built to protect the coast from erosion.

SACs - Special Areas of Conservation have been selected from the prime examples of wildlife conservation areas in Ireland. Their legal basis from which selection is derived is The Habitats Directive (92/43/EEC of the 21st May 1992). SAC's have also been known as cSAC's which stands for "candidate Special Areas of Conservation", and pcSAC's which stands for "proposed candidate Special Areas of Conservation."

Seawalls – walls built parallel to the shoreline to limit shoreline recession.

SPAs - Special Protection Areas for Birds are areas that have been designated to ensure the conservation of certain categories of birds. Ireland is required to conserve the habitats of two categories of wild birds under the European Birds Directive (Council Directive 79/ 409/ 2nd April 1979).

Species - The lowest unit of classification normally used for plants and animals.

Training walls – walls constructed at the entrances of estuaries and rivers to improve navigability and direct current flow.

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1. INTRODUCTION

1.1 COASTAL MONITORING PROJECT

This project is the first comprehensive national survey of Irish sand dune and machair sites. The project was carried out in three phases, with site visits conducted in 2004, 2005 and 2006. The first phase in 2004 comprised 44 sites from Louth to Wexford, while the 2005 survey comprised 36 sites in Waterford, Cork and Kerry. The final phase of the survey in 2006, consisted of 101 sites from Clare to Donegal (Table 2.1; Figure 2.1). The project involved the updating of an existing inventory of sand dune systems (Curtis, 1991a), the production of habitat maps of all survey sites, the establishment of a coastal habitats database and an assessment of the conservation status of all dune habitats in Ireland, both nationally and on a site-by-site basis. The survey did not encompass a phytosociological study of sand dune communities. The project was carried out in order to meet Ireland's obligations under Articles 11 & 17 of the EU Habitats Directive, relating to the monitoring of, and reporting on, the conservation status of habitats. A methodology employing rapid and simple assessment techniques for monitoring sand dune habitats was developed.

1.2 GENERAL DESCRIPTION

The general ecology and status of the vegetation communities of sand dunes are well documented in Irish coastal systems (Beckers *et al*., 1976; Nooren & Schouten, 1976; Jeffrey, 1977; Ní Lamhna, 1982; White & Doyle, 1982; Curtis, 1991b; Crawford *et al*., 1996; Fossit, 2000; Gaynor, 2006).

Sand is an inhospitable substrate for plant growth and colonisation is restricted to highly specialised plants that have evolved strategies to withstand the problems caused by salt, dryness, low nutrient levels, and instability. Coastal sand dunes develop where there is an adequate supply of sand (sediment within the size range 0.2 to 2.0 mm) in the intertidal zone and where onshore winds are prevalent. Of critical importance is the presence of a sufficiently large beach plain, the surface of which dries out between high tides. The dry sand is then blown landwards and deposited above high water mark, where it is trapped by specialised dune-building grasses which grow up through successive layers of deposited sand.

In a typical dune formation sequence, strandline plants colonise at or just beyond the high tide mark of normal tides, where tidal debris, including seaweed, may harbour plant seeds and provide protection from high temperatures and evaporation. Sand accumulation which persists above the high tide line of normal tides may be colonised by the first perennial plants in dune succession to form embryonic dunes. These plants – normally specialised grasses, the most common of which in Ireland is Sand Couch *Elytrigia juncea* - have the ability to withstand periodic exposure to salt water and temporary burial in freshly deposited sand.

As embryonic dunes accumulate, the dune surface is raised above the level of normal tides and the sand, partly through washing by fresh rainwater, becomes less salty. In these conditions *Ammophila arenaria* (Marram) - the major dune building grass - is able to colonise. It is tall and robust (but flexible in the wind) and very effective at trapping sand by reducing the windspeed at the surface. The environment is still too inhospitable for all but a very few plants and the dominant Marram is surrounded by large areas of bare ground.

On the landward side of the frontal dunes the surface is more sheltered from onshore winds and the effects of sea spray. More plants are able to colonise and species diversity starts to increase. Further inland, where the vegetation has developed so that it forms a more or less complete cover of the substrate, the habitat is referred to as fixed dunes. Over time, thin soils are produced by the breakdown of organic matter. Under ideal conditions, nitrogen-fixing herbaceous species and *Festuca rubra* (Red fescue grass) dominate the dune grasslands. Marram, however, can often remain as a major component of the vegetation, particularly where there is an absence of grazing. Mosses and lichens become more common as the grassland matures and it is because of the presence of lichens that the term 'grey dunes' is often applied to fixed dunes.

Humid dune slacks are often found in topographically low areas between dune ridges. They are generally wetter, due to the close proximity of the water table and therefore support a different set of plant species. The drier parts of slacks may be dominated by *Salix repens*, in which case the vegetation may be assigned to a separate community or habitat.

At the older landward edge of the fixed dunes, leaching of basic minerals and nutrients can lower the pH over time and create conditions suitable for colonisation by heath species. 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. Well-developed dune heath communities containing the classic dwarf ericoid shrubs, such as *Calluna vulgaris* (Heather), and *Erica* spp., that are generally regarded as characterising the habit, are not well represented in Ireland.

Successions from scrub to semi-natural or native woodland may be the natural development at the landward edge of the dunes, but such is the pressure of developments and agricultural use, that such habitats are all but unknown in Ireland. Where woodland does exist at the landward side of dune systems, it usually consists of planted exotic conifer species.

Machair is a complex sand dune habitat that, in Ireland, is confined to the Northwest coast. It is generally found in flat coastal sand plains that have a history of grazing. Usually there is a significant proportion of shell fragments in the sand, producing a lime-rich soil and therefore high pH. The sand may be blown inland for considerable distances. Typically, the closed vegetation has a low cover of sand-binding species. The vegetation is often composed of both wet and dry communities and although there is generally an obvious distinction between the dry and wet types, transitional communities are common.

1.3 EU HABITATS DIRECTIVE (94/43/EEC)

The obligation to provide protection for a range of habitats, including those associated with sand dune systems, is expressed in the EU Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora), adopted in 1992. The directive requires that certain habitats and species of community interest - listed on a number of 'Annexes' - are afforded special protection, and it is the legal basis on which Special Areas of Conservation (SAC's) are selected and designated. Habitats that require designation and specific conservation measures are termed Annex I habitats. Habitats that merit special attention because they are

considered to be in danger of disappearing, and whose natural range falls within the territory of the EU, are termed priority habitats. The Annex II list is comprised of species that must be afforded special protection. It is the responsibility of each EU member state to protect Annex I habitats and Annex II species through the designation of appropriate SAC's. These, together with Special Protection Areas (SPA's), designated under the EU Birds Directive (Council Directive 79/409/EEC of April 1979, on the conservation of wild birds) form a European complex of protected sites known as the 'NATURA 2000' network.

The following, with habitat names as listed in the 'Interpretation Manual of European Habitats' of April 2003 (and codes in parentheses), comprises the list of Annex I sand dune habitats of relevance to the present survey:

- Annual vegetation of driftlines (1210)
- Perennial vegetation of stony banks (1220)
- 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 fixed dunes with *Empetrum nigrum* *(2140)
- Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) *(2150)
- Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariea*) (2170)
- Humid dune slacks (2190)
- Machairs *$^{+}$ (21A0)

(* Indicates a priority habitat)
($^{+}$ A priority habitat in Ireland only)

The overall objective of the Habitats Directive is to achieve and maintain favourable conservation status for all habitats and species of community interest; and to contribute towards maintaining biodiversity of natural habitats and of wild flora and fauna in member states. To this end, EU member states are obliged, as expressed in Article 11 of the Habitats Directive, to monitor the conservation status of habitats and species. As all habitats (as listed in Annex I) and species of community interest (including Annex II, and also Annex IV[1] & Annex V[2]) are included, the monitoring requirement is not restricted to NATURA 2000 sites, but encompasses the total national resource of each habitat. Consequently, data must be collected both within and outside the NATURA network. The inclusion of both designated and non-designated sites in the present survey reflects this provision. In addition, member states are obliged - as expressed in Article 17 of the Habitats Directive - to report to the commission every six years on the implementation of measures taken towards meeting the objectives of the directive. The current project is notable in that all known sites for sand dune habitats were assessed. A small number of sites were not visited due to accessibility problems, although these were also assessed using the best available information.

[1] Animal and plant species of community interest in need of strict protection measures
[2] Animal and plant species of community interest whose taking in the wild and exploitation may be subject to management

The importance of data collected and reported under the Habitats Directive goes beyond the implementation of the directive itself. They are also a crucial element of broader biodiversity conservation policy, such as the aim of halting the loss of biodiversity by 2010, as set out by the EU heads of state at the Gothenburg summit in 2001. Information gathered will also be valuable for site management plans and will be important in the development and implementation of biodiversity indicator lists, which will be used to form a picture of overall biodiversity trends.

The current project, carried out on behalf of the National Parks and Wildlife Service (NPWS), is designed to meet the monitoring requirements of the Habitats Directive, with regard to sand dune systems in Ireland. The methodology employed was adapted from a system of habitat monitoring developed by the Joint Nature Conservancy Council (JNCC) - the statutory adviser to the UK Government on national and international nature conservation issues. The JNCC protocols for various habitats have been conveyed in a series of Common Standards Monitoring (CSM) guidance documents (JNCC, 1998 and 2004a, b & c). This system is based on vegetation surveys, measurement of habitat areas, and assessments of threats and management practices. It employs rapid assessment techniques that can be easily repeated in the future implementation of the monitoring programme.

1.4 CONSERVATION STATUS

Favourable Conservation Status is the overall objective to be reached for all habitat types and species of community interest. 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. It is not, therefore, simply a question of the habitat or species being free from the risk of imminent extinction. EU member states are expected to take all requisite measures to reach and maintain the objective of Favourable Conservation Status for habitats and species. Where habitats are failing to meet the standards necessary for favourable conservation status, it is the responsibility of member states to implement strategies/management regimes aimed at rectifying this situation.

In order that the legal obligation for monitoring and reporting on the conservation status of habitats within Member States can be carried out, a system for assessing and reporting on the conservation status has been established by the Scientific Working Group of the Habitats Committee. The latest version of the scheme - DocHab 04-03/03-rev.3: Annex E - (Appendix 1 of the present report) has been employed in the current phase of the project, while a previous version (04-09/02) was used in an initial assessment of east coast sites in 2004 (Coastal Monitoring Project Report, 2004). Data from the 2004 survey sites have been adapted to meet the specifications of the current version.

1.5 SALTMARSH SURVEY

During the initial survey phase in 2004, the feasibility of including salt marshes within the scope of the coastal monitoring project was examined. Salt marshes directly adjacent to the east coast sand dune systems were surveyed, and data, in the form of species lists, vegetation quadrats, assessments of threats, and other miscellaneous data, were collected. The salt marshes were also mapped, based on the occurrence of four of the Annex I saltmarsh habitats recognised in Ireland:

- *Salicornia* and other annuals colonising mud and sand (1310)
- *Spartina* swards (Spartinion) (1320)
- Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (1330)
- Mediterranean salt meadows (1410)

Due to limitations on time and budget, this aspect of the survey was discontinued in 2005 and data were not collected on salt marshes adjacent to sand dune systems from Waterford to Donegal. However, data collected on the east coast sites are being used to inform a separate saltmarsh monitoring programme (contract reference D/C/191) that commenced in 2006. Habitat maps, species lists, assessments of threats, and other data provided useful site information and were used in the site selection process.

1.6 OBJECTIVES OF THE PROJECT

The aims of this project were to:

1) Update the inventory of Irish sand dune systems from Curtis (1991a)
2) Develop a monitoring programme for Irish sand dune habitats
3) Establish the area of the total national resource of each habitat
4) Produce habitat maps for each coastal dune site
5) Assess the conservation status of each habitat at all sites
6) Assess the conservation status of each habitat on a national basis
7) Establish a database in which the results of this and future monitoring surveys of sand dune habitats can be entered and analysed
8) Produce a report for each site, incorporating a general site description, descriptions of each habitat recorded, conservation status assessment of each habitat and an assessment of impacts and activities

2. METHODS

2.1 BACKGROUND TO CONSERVATION STATUS ASSESSMENT OF EU ANNEX I HABITATS

The method employed in the conservation status assessment of Annex I habitats, as outlined in the Habitats Directive (Council Directive 92/43/EEC), is referred to as the 'Traffic light' system, as the colours green, amber and red are taken to represent the various categories of conservation status assessment, as follows:

- Favourable (Green)
- Unfavourable-Inadequate (Amber)
- Unfavourable-Bad (Red)
- Unknown (insufficient information to make an assessment)

The habitat parameters employed (in bold type) in assessing conservation status, with explanations of conditions acceptable for Favourable status [Green] are:

- **Range** - Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference range'.[3]
- **Area (Extent) covered by habitat type within range** – Stable (loss and expansion in balance) or increasing, AND not smaller than the 'favourable reference area[4], AND without significant changes in distribution pattern within range (if data available)
- **Specific structure and functions –** Structure and functions (including typical species) in good condition and no significant deterioration/pressures.
- **Future prospects** – The habitats prospects for its future are excellent/good, no significant impact from threats expected; long-term viability assured.

Undesirable deviations from favourable condition are ranked as *unfavourable – inadequate* (amber) or *unfavourable – bad* (red), depending on the degree to which they fail to meet the required condition, e.g. **Range** is considered *unfavourable – inadequate* (amber) if both of the criteria for *favourable* status are not met, and *unfavourable – bad* (red) if there has been a large decrease – equivalent to a loss of more than 1% per year within the period specified by a member state OR more than 10% below 'favourable reference range'. The overall habitat conservation status

[3] Favourable reference range is the range within which all significant ecological variations of the habitat/species are included for a given biogeographical region and which is sufficiently large to allow the long term survival of the habitat/species; favourable reference value must be at least the range (in size and configuration) when the Habitats Directive came into force; if the range was insufficient to support a favourable status the reference for favourable range should take account of that and should be larger (in such a case information on historic distribution may be useful when defining the favourable reference range); 'best expert judgement may be used to define it in absence of other data

[4] Favourable reference area is the total surface area in a given biogeographical region considered the minimum necessary to ensure the long-term viability of the habitat type; this should include necessary areas for restoration or development for those habitat types for which the present coverage is not sufficient to ensure long-term viability; favourable reference value must be at least the surface area when the Directive came into force; information on historic distribution may be found useful when defining the favourable reference area; 'best expert judgement' may be used to define it in absence of other data.

assessment depends on the combination of green, amber and red judgements assigned to the parameters, as follows:

- **Favourable** (Green): All parameters 'green' or three 'green' and one 'unknown'
- **Unfavourable-Inadequate** (Amber): One or more 'amber' but no 'red'
- **Unfavourable-Bad** (Red): One or more 'red'
- **Unknown**: Two or more 'unknown' combined with green, or all 'unknown'.

The current set of parameters (General Evaluation Matrix), as used in this project is shown in Appendix 1. It is explicitly accepted in Habitats committee draft documents on reporting formats, that, as the current reporting period is the first in the cycle, some data required for conservation assessments may not be available. In these cases it is necessary to use the best available information, including that derived from 'expert judgements' or 'best scientific judgements'.

Estimation of conservation status for each habitat involves assessment of four parameters – 1. Range, 2. Area/Extent, 3. Specific structures and functions, and 4. Future prospects (DocHab 04-03/03-rev.3). As range cannot be applied to the assessment of each individual site, the system employed in determining conservation status assessments of sand dune habitats at each site involves consideration of the three remaining criteria shown in Table 2.1. Range is included, along with the other three parameters, in the overall conservation status assessment of habitats as described in Annex D (Reporting format for Annex I habitat types) of the Explanatory Notes & Guidelines for the Assessment, monitoring and reporting under Article 17 of the Habitats Directive.

Area (extent) includes an appraisal of site diversity and dynamics. Structure and functions refers to the habitat attributes that are tested at monitoring stops (see below), e.g., in the case of embryonic dunes, it comprises (a) presence of typical species, (b) flowering and fruiting (and general health) of foredune grasses and (c) presence of negative indicator species. Future prospects, in addition to the criteria outlined above, are also taken to include consideration of the status of 'features of local distinctiveness' at each site.

Table 2.1 Summary matrix of the parameters and conditions required to assess the conservation status of habitats

	Favourable	**Unfavourable – Inadequate**	**Unfavourable - Bad**
Range	Stable	1% decline/year	> 1% decline/year
Area	Stable	1% decline/year	> 1% decline/year
Structure & Functions	Stable	1 – 25% area is unfavourable	> 25% area is unfavourable
Future Prospects	Prospects excellent or good/long term viability of habitat assured	Any set of conditions between those of favourable and unfavourable-bad	Severe impact from threats/habitat rapidly declining
Overall	All green	Combination of green and amber	One or more red

Area and structure and functions are considered to be in *favourable* condition if they have remained stable since the previous monitoring or most recent survey. A decline in extent of 1% or >1% leads to *unfavourable – inadequate* or *unfavourable – bad*

judgements, respectively, for Area. Structure and functions are thought to be *unfavourable – inadequate* if 1-25% of the total area is considered unfavourable, and *unfavourable – bad* if more than 25% of the total area is considered unfavourable. If the habitat is not under significant impact from threats, with long term viability assured, and future prospects are thought to be excellent or good, then future prospects may be assigned *favourable* status. If the habitat is under severe impact from threats, and rapidly declining, with long-term viability not assured, then future prospects will be *unfavourable – bad*. Any set of conditions falling between these two extremes will result in an *unfavourable – inadequate* assessment.

A *favourable* (green) judgement for each of the main criteria leads to an overall *favourable* judgement. A combination of *favourable* (green) and *unfavourable – inadequate* (amber) leads to an overall *unfavourable - inadequate* assessment, while the inclusion of any *unfavourable – bad* (red) assessment automatically results in an overall *unfavourable – bad* (red) judgement (Table 2.2).

Table 2.2 Examples of permutations of the habitat conservation status parameters and the overall conservation status assessment

Habitat	EU Conservation Status			
	Favourable	**Unfavourable – Inadequate**	**Unfavourable – Bad**	**Overall EU conservation status assessment**
---	Area/Structure & functions/Future prospects			**Favourable**
---	Area/Structure & functions	Future prospects		**Unfavourable - Inadequate**
---		Area/Structure & functions/ Future prospects		**Unfavourable - Inadequate**
---			Area/Structure & functions/Future prospects	**Unfavourable - Bad**
---	Structure & functions/Future prospects		Area	**Unfavourable-Bad**

In addition to the EU conservation assessment, an Irish system of habitat condition assessment has been developed by NPWS and is proposed for use in a 3-yearly reporting cycle. Four principal categories of habitat condition are envisaged for the Irish system with further subdivisions as follows:

- Favourable - Enhanced / Maintained / Recovered / Declining
- Unfavourable - Recovering / Unchanged / Declining
- Destroyed - Partially destroyed / Completely destroyed
- Unknown – Insufficient information available

This system was also used in the present survey, and an assessment chosen for each habitat at all of the sites. Formalised criteria for determining habitat assessments under this system have yet to be established, so the assessments in each case were simply chosen on how appropriately they correspond to the EU conservation status assessment, and are based on the judgement of the report authors. This system is useful to the current project in that the subdivision categories such as *enhanced*,

recovered, and *declining* provide information on trends in habitat condition that are not immediately apparent from the EU system ratings.

The correlation between the EU Traffic light scheme proposed for assessing habitat condition and the scheme suggested by the NPWS for its Site Inventory Database is shown in Figure 2.1.

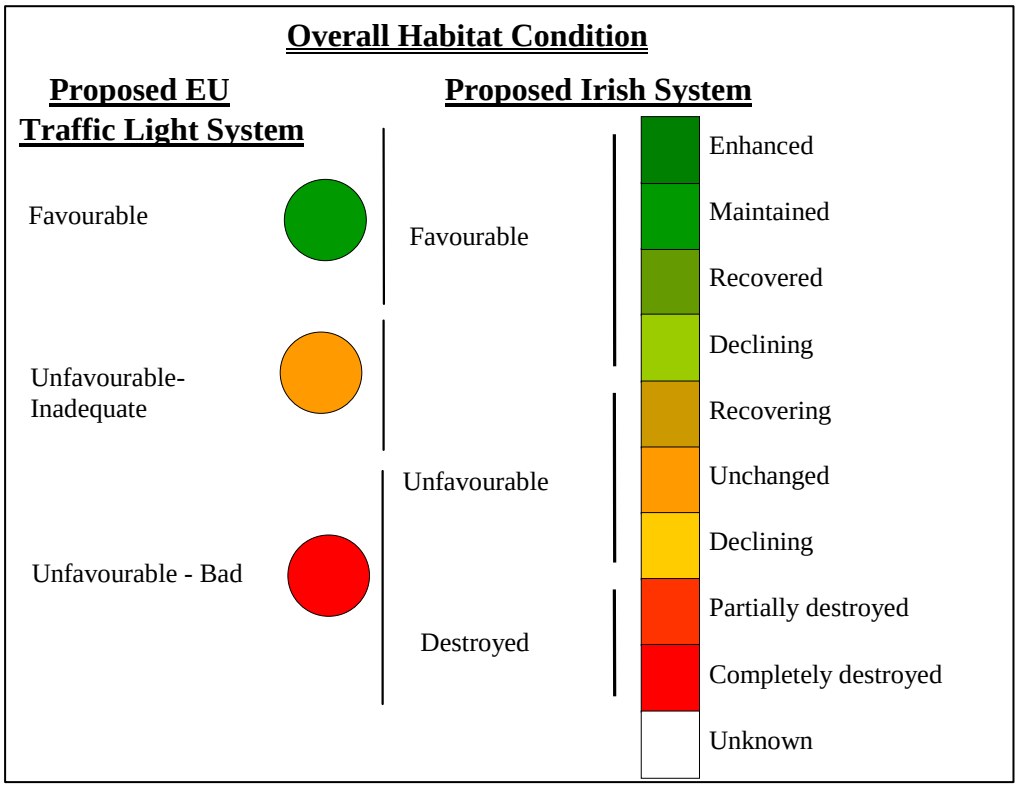

Figure 2.1 Comparison between the proposed EU habitat conservation assessment (Traffic light system) and that being developed for use by NPWS in its Site Inventory Database.

2.2 DEVELOPMENT OF MONITORING METHODOLOGY

2.2.1 Preliminary Work

In order to establish information on coastal habitats and the survey sites, and to develop a monitoring methodology, the following were carried out:

- A review of literature on coastal monitoring.
- Compilation of site packs from the NPWS records containing the following: Site Management Plans for cSAC sites; NHA files; NATURA 2000 reports; 1995 & 2000 series aerial photographs; 6'' Maps; Any additional miscellaneous information.
- A review of the JNCC Common Standards Monitoring manuals for coastal habitats; and the development of a monitoring methodology for sand dune habitats in Ireland, in consultation with NPWS research staff.
- Development of fieldcards.
- Consultation with local authorities in relation to matters of planning and development, environment and coastal management etc.
- Establishment of a database to store the information gathered during field surveys.

- A compilation of relevant surveys for historical comparisons with the current survey.

As the current survey represents the first application of this conservation status assessment method, there were few comparable sources of data to serve as a baseline against which the current data could be compared, although some sources of relevant information, such as the Biomar Machair survey in 1996 (Crawford *et al*.) included habitat maps and vegetation data which proved valuable.

Although 1997 was the date at which the first tranche of cSACs were advertised, 1996 was chosen as the baseline date with which to compare the present data. The Biomar Machair survey of 1996 (Crawford *et al*.) represents one of the most useful and extensive sources of information for the purposes of comparison with data produced in the present survey. A significant number of sand dune sites were mapped and numerous vegetation quadrats, which contained sufficient data to be comprehensively re-interpreted under the current monitoring stop protocol, were carried out in that survey. Nevertheless, only sand dunes at which machair formed a significant element of the sites were surveyed and there are no similar data available with which the majority of the sites in the present survey could be compared.

2.2.2 Survey Site Selection

The updated site list (Table 2.3, Figure 2.2) was based on a National Inventory of sand dune sites (Curtis, 1991a) and additional information supplied from NPWS staff. Several sites not on the original list were added on the advice of NPWS staff or following an examination of aerial photographs that indicated the presence of some previously unconsidered sites.

Of the updated total of 181 sites, all but four were assessed by means of data collected on site visits. Of the sites for which a field survey was not carried out, access difficulties – usually either geographical inaccessibility or issues with private owners – were generally the reasons for the failure to carry out a field survey. The sites not visited, or those at which a significant proportion of the total area was not surveyed, were: Inch, Co. Kerry (site 070), Finish Island, Co. Galway (site 094), Fahy, Co. Mayo (site 116), Trawalua, Co. Sligo (site 138) and Rutland Island, Co. Donegal (site 152).

The privately owned Inch in Co. Kerry (site 070), and the privately owned northern section of Trawalua in Sligo (site 138), were not visited. However, much of the latter site was surveyed: the distinction between the surveyed and unsurveyed areas is indicated in the relevant site report.

Finish Island in Galway (site 211) is a small uninhabited island in Kilkieran Bay. A site visit was attempted, in the expectation that the island could be reached on foot at low tide. However, the attempted crossing to the island proved inadvisable. It may be that it is only reachable on foot during particularly low tides, i.e. during a spring tide phase. Some data and mapping points were collected on the adjacent mainland, and these are included in the site map and report.

Rutland Island (site 152) was not in the original site inventory, but was added on the advice of local conservation staff. There is no ferry service available to the Island, and

the hiring of a private boat, which would be necessary for a site visit, was not achieved during the short time spent in the area. The adjacent Eighter Island (grid reference: B 696 164) was also identified as a possible site of interest and may be worth investigating during future monitoring surveys.

Fahy sandhills (site 116) were not visited due to timetabling difficulties – the site was not on the original site inventory and was only identified as a site of interest after the other sites in the area had been surveyed. There are apparently no obstacles to gaining access to this site, and it should be visited during future sand dune monitoring surveys.

Table 2.3 Updated list of Irish sand dune sites

	Dune System	County	Designation[1]	Site Name	Associated Saltmarsh	Site Code[2]
1	Cruisetown	Louth	Dedesignated	Cruisetown Sandhills	-	(1460)
2	Baltray	Louth	cSAC	Boyne Coast and Estuary	Present	1957
3	Mornington	Meath	cSAC	Boyne Coast and Estuary	Present	1957
4	Laytown	Meath	pNHA	Laytown Dunes/ Nanny Estuary	-	554
5	Rush	Dublin	cSAC	Rogerstown Estuary (Rush Sandhills)	-	208 (1217)
6	Portrane	Dublin	cSAC	Rogerstown Estuary	Present	208
7	Malahide Island	Dublin	cSAC	Malahide Estuary	Present	205
8	Ireland's eye	Dublin	cSAC	Ireland's Eye	-	2193
9	Portmarnock	Dublin	cSAC	Baldoyle Bay	Present	199
10	North Bull	Dublin	cSAC	North Dublin Bay	Present	206
11	South Bull	Dublin	cSAC	North Dublin Bay	Present	206
12	Killiney	Dublin	pNHA	Killiney Hill and Dalkey Coastal Zone	-	1206 (1210)
13	Kilcoole	Wicklow	cSAC	The Murrough Wetlands	-	2249
14	Ballybla	Wicklow	cSAC	The Murrough Wetlands	-	2249
15	Magheramore	Wicklow	cSAC	Magherabeg Dunes	-	1766
16	Magherabeg	Wicklow	cSAC	Magherabeg Dunes	-	1766
17	Brittas Bay	Wicklow	cSAC	Buckroney-Brittas Dunes and Fen	-	729
18	Mizen Head	Wicklow	cSAC	Buckroney-Brittas Dunes and Fen	-	729
19	Pennycomequick	Wicklow	cSAC	Buckroney-Brittas Dunes and Fen	-	729
20	Arklow North	Wicklow	pNHA	Arklow Sand dunes	-	1746
21	Arklow South	Wicklow	pNHA	Arklow Sand dunes	-	1746
22	Askintinny	Wicklow	pNHA	Arklow Rock-Askintinny	-	1745
23	Kilpatrick	Wexford	cSAC	Kilpatrick Sandhills	-	1742
24	Kilgorman	Wexford	Dedesignated	Kilgorman Sandhills	-	(1739)
25	Courtown	Wexford	pNHA	Courtown Dunes and Glen	-	757
26	Ardamines	Wexford	Not Designated	-	-	-
27	Donaghmore	Wexford	pNHA	Donaghmore Sandhills	-	1737
28	Cahore Point North	Wexford	SAC	Cahore Polders and Dunes	-	700
29	Cahore Point South	Wexford	pNHA	Ballyteige Marsh	-	1930
30	Kilmuckridge	Wexford	cSAC	Kilmuckridge-Tinnaberna Sandhills	-	1741
31	Tinnaberna	Wexford	cSAC	Kilmuckridge-Tinnaberna Sandhills	-	1741
32	Ballynamona	Wexford	Dedesignated	Ballynamona Sandhills	-	(1735)
33	Ballynaclash	Wexford	pNHA	Ballynaclash-Curracloe	-	712 (701)
34	Curracloe	Wexford	pNHA	Ballynaclash-Curracloe	-	712 (701)
35	The Raven	Wexford	cSAC	Raven Point Nature Reserve	Present	710
36	Rosslare	Wexford	Dedesignated	Rosslare Point	Present	(2271)
37	St. Helen's	Wexford	Not Designated	-	-	-

[1] PNHA (PROPOSED NATURAL HERITAGE AREA) - NO COASTAL NHA'S HAVE BEEN RATIFIED UNDER IRISH LAW TO DATE. CSAC (CANDIDATE SPECIAL AREAS OF CONSERVATION) HAVE BEEN SUBMITTED TO EUROPE FOR RATIFICATION.

[2] Site codes in brackets refer to adjacent sites, or in the case of dedesignated sites, sites that were originally considered as potential NHA's but did not satisfy the final selection criteria.

(*cont'd overleaf*)

Table 2.3 Updated list of Irish sand dune sites (*Cont'd*)

	Dune System	County	Designation[1]	Site Name	Associated Saltmarsh	Site Code[2]
39	Carnsore	Wexford	Not Designated		-	
40	Tacumshin	Wexford	cSAC	Tacumshin Lake	Present	709
41	Ballyteige Burrow	Wexford	cSAC	Ballyteige Burrow	Present	696
42	Bannow Island	Wexford	cSAC	Bannow Bay	Present	697
43	Grange	Wexford	cSAC	Bannow Bay	Present	697
44	Duncannon	Wexford	pNHA	Duncannon Sandhills	-	1738
45	Woodstown	Waterford	cSAC	Waterford Harbour	-	787
46	Tramore	Waterford	cSAC	Tramore Dunes and Backstrand	Present	671
47	Bunmahon	Waterford	Not Designated	-	-	-
48	Clonea	Waterford	Not Designated	-	-	-
49	Spit Bank (Skehacrine)	Waterford	pNHA	Dungarvan Harbour	Present	663
50	Cunnigar Point	Waterford	pNHA	Dungarvan Harbour	Present	663
51	Ardmore Bay	Waterford	Not Designated	(Ardmore Head)	-	(2123)
52	Whiting Bay	Waterford	Not Designated	-	-	-
53	Ballyvergen East	Cork	pNHA	Ballyvergen Marsh	-	182
54	Ballymacoda	Cork	cSAC	Ballymacoda (Clonpriest & Pillmore)	Present	077
55	Shanagarry	Cork	pNHA	Ballycotton, Ballynamona & Shanagarry	Present	076
56	Garrettstown	Cork	Not Designated	(Garrettstown & Garrylucas marsh)	-	(1053 / 087)
57	Harbour view (Garranefeen Strand)	Cork	cSAC	Courtmacsharry Estuary	Present	1230
58	Inchydoney	Cork	cSAC	Clonakilty Bay	-	091
59	Dirk Bay	Cork	pNHA	Dirk Bay	-	1498
60	Castlefreke	Cork	cSAC	Kilkieran Lake and Castlefreke Dunes	-	1061
61	Owenahincha & Little Island Strand	Cork	Not Designated	-	-	-
62	Warren (Creggane)	Cork	pNHA	Rosscarbery Estuary	Present	1075
63	Sherkin Island	Cork	cSAC	Roaringwater Bay and Islands	-	101
64	Barley Cove	Cork	cSAC	Barleycove to Ballyrisode Point	Present	1040
65	Ballydonegan	Cork	Not Designated	-	-	-
66	Derrynane	Kerry	cSAC	Kenmare River	Present	2158
67	Waterville	Kerry	cSAC	Ballinskelligs Bay and Inny Estuary	-	335
68	Rossbehy	Kerry	cSAC	Castlemaine Harbour	Present	343
69	Lough Yganavan	Kerry	cSAC	Lough Yganavan & Lough Nambrackderrig	-	370
70	Inch	Kerry	cSAC	Castlemaine Harbour	Present	343
71	Ventry	Kerry	pNHA	Ventry Dunes and Marsh	-	1384
72	Ballyferriter	Kerry	pNHA	Smerwick Harbour Sandhills & marshes	-	1958
73	Ballydavid	Kerry	pNHA	Smerwick Harbour Sandhills & marshes	-	1958
74	Fermoyle	Kerry	cSAC	Tralee Bay & Magherees Peninsula, West to Cloghane	Present	2070
75	Castlegregory	Kerry	cSAC	Tralee Bay & Magherees Peninsula, West to Cloghane	-	2070
76	Derrymore Island	Kerry	cSAC	Tralee Bay & Magherees Peninsula, West to Cloghane	-	2070
77	Banna Strand	Kerry	cSAC	Akeragh, Banna & Barrow Harbour	Present	332
78	Ballyheige	Kerry	cSAC	Akeragh, Banna & Barrow Harbour	Present	332

[1] PNHA (PROPOSED NATURAL HERITAGE AREA) - NO COASTAL NHA'S HAVE BEEN RATIFIED UNDER IRISH LAW TO DATE. CSAC (CANDIDATE SPECIAL AREAS OF CONSERVATION) HAVE BEEN SUBMITTED TO EUROPE FOR RATIFICATION.

[2] Site codes in brackets refer to adjacent sites, or in the case of dedesignated sites, sites that were originally considered as potential NHA's but did not satisfy the final selection criteria.

(*cont'd overleaf*)

Table 2.3 Updated list of Irish sand dune sites (*Cont'd*)

	Dune System	County	Designation[1]	Site Name	Associated Saltmarsh	Site Code[2]
79	Ballybunion	Kerry	pNHA	Cashen River Estuary	-	1340
80	Beal Point	Kerry	pNHA	Beal Point	-	1335
81	White Strand	Clare	cSAC	Carrowmore Dunes	-	2250
82	Lough Donnell	Clare	cSAC	Carrowmore Point to Spanish Point and Islands	-	1021
83	Lurga Point	Clare	cSAC	Carrowmore Point to Spanish Point and Islands	-	1021
84	Spanish Point	Clare	cSAC	Carrowmore Point to Spanish Point and Islands	-	1021
85	Lahinch	Clare	cSAC	Inagh River Estuary	Present	36
86	Fisherstreet	Clare	Not Designated	-	-	(20 & 26)
87	Fanore	Clare	cSAC	Black Head – Poulsallagh Complex	-	20
88	Bishopsquarter	Clare	cSAC	Galway Bay Complex	-	268
89	Inishsheer	Galway	cSAC	Inisheer Island	-	1275
90	Inishmaan	Galway	cSAC	Inishmaan Island	-	212
91	Eararna	Galway	cSAC	Inishmore Island	-	213
92	Portmurvy	Galway	cSAC	Inishmore Island	-	213
93	Barna	Galway	cSAC	Galway Bay Complex	-	268
94	Finish Island	Galway	cSAC	Kilkieran Bay and Islands	-	2111
95	Mweenish Island	Galway	cSAC	Kilkieran Bay and Islands	-	2111
96	Mason Island	Galway	cSAC	Kilkieran Bay and Islands	-	2111
97	Dog's Bay	Galway	cSAC	Dog's Bay	Present	1257
98	Doolan	Galway	cSAC	Murvey Machair	-	2129
99	Ballyconeely	Galway	cSAC	Slyne Head Peninsula	Present	2074
100	Aillebrack	Galway	cSAC	Slyne Head Peninsula	-	2074
101	Doonloughan	Galway	cSAC	Slyne Head Peninsula	-	2074
102	Mannin Bay	Galway	cSAC	Slyne Head Peninsula	-	2074
103	Leagaun	Galway	pNHA	Leagaun Machair	-	1289
104	Omey Island	Galway	cSAC	Omey Island Machair	-	1309
105	Augrusbeg	Galway	cSAC	Augrusbeg Machair and Lake	-	1228
106	Inishbofin	Galway	cSAC	Inishbofin and Inishshark	-	278
107	Gowlaun	Galway	cSAC	The Twelve Bens/Garraun Complex	-	2031
108	Dooaghtry	Mayo	cSAC	Mweelrea/Sheefry/Errif Complex	Present	1932
109	Lough Cahasy	Mayo	cSAC	Lough Cahasy, Lough Baun and Roonah Lough	-	1529
110	Cloghmoyle	Mayo	pNHA	Cloghmoyle Dunes	-	1483
111	Bartraw	Mayo	cSAC	Clew Bay Complex	Present	1482
112	Rossmurrevagh	Mayo	cSAC	Clew Bay Complex	Present	1482
113	Keel Lough	Mayo	cSAC	Keel Machair/Menaun Cliffs	-	1513
114	Lough Doo	Mayo	cSAC	Dogort Machair/Lough Doo	-	1497
115	Corraun Point	Mayo	pNHA	Corraun Point Machair/Dooreel Creek	Present	1488
116	Fahy	Mayo	Undesignated	-	-	-
117	Trawboy	Mayo	pNHA	Tullaghan Bay	-	1567
118	Kinrovar	Mayo	pNHA	Kinrovar Machair	-	512
119	Dooyork	Mayo	cSAC	Mullet/Blacksod Complex	-	470
120	Doo Lough	Mayo	cSAC	Mullet/Blacksod Complex	-	470
121	Srah South	Mayo	cSAC	Mullet/Blacksod Complex	-	470
122	Srah North	Mayo	cSAC	Mullet/Blacksod Complex	-	470
123	Inishkea North	Mayo	cSAC	Inishkea Islands	-	507
124	Agleam	Mayo	cSAC	Mullet/Blacksod Complex	-	470
125	Leam Lough	Mayo	cSAC	Mullet/Blacksod Complex	-	470
126	Cross Lough	Mayo	cSAC	Mullet/Blacksod Complex	-	470

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[2] Site codes in brackets refer to adjacent sites, or in the case of dedesignated sites, sites that were originally considered as potential NHA's but did not satisfy the final selection criteria.

(*cont'd overleaf*)

Table 2.3 Updated list of Irish sand dune sites (*Cont'd*)

	Dune System	County	Designation[1]	Site Name	Associated Saltmarsh	Site Code[2]
127	Termoncarragh Lough	Mayo	cSAC	Mullet/Blacksod Complex	-	470
128	Garter Hill	Mayo	cSAC	Glenamoy Bog Complex	-	500
129	Lackan	Mayo	cSAC	Lacken Saltmarsh and Kilcummin Head	Present	516
130	Ross	Mayo	cSAC	Killala Bay/Moy Estuary	Present	458
131	Bartragh Island	Mayo	cSAC	Killala Bay/Moy Estuary	Present	458
132	Inishcrone	Sligo	cSAC	Killala Bay/Moy Estuary	-	458
133	Strandhill	Sligo	cSAC	Ballysadare Bay	Present	622
134	Coney Island	Sligo	cSAC	Cummeen Strand/Drumcliff Bay (Sligo Bay)	-	627
135	Rosses Point	Sligo	cSAC	Cummeen Strand/Drumcliff Bay (Sligo Bay)	-	627
136	Yellow Strand	Sligo	cSAC	Cummeen Strand/Drumcliff Bay (Sligo Bay)	-	627
137	Streedagh Point	Sligo	cSAC	Streedagh Point Dunes	Present	1680
138	Trawlua Strand	Sligo	cSAC	Bunduff Lough and Machair/Trawlua	-	625
139	Bunduff	Sligo	cSAC	Bunduff Lough and Machair/Trawlua	-	625
140	Finner	Donegal	pNHA	Erne Estuary/Finner Dunes	-	139
141	Rossnowlagh	Donegal	cSAC	(Donegal Bay, Durnesh Lake)	-	(133 & 138)
142	Mullanasole	Donegal	cSAC	Donegal Bay (Murvagh)	Present	133
143	Mountcharles	Donegal	cSAC	Donegal Bay (Murvagh)	-	133
144	Inver	Donegal	Not Designated	-	-	-
145	Fintragh	Donegal	Not Designated	-	Present	-
146	Glen Bay	Donegal	cSAC	Slieve Tooey/Tormore Island/Loughros Beg Bay	-	190
147	Maghera	Donegal	cSAC	Slieve Tooey/Tormore Island/Loughros Beg Bay	Present	190
148	Sheskinmore	Donegal	cSAC	West of Ardara/Maas Road	Present	197
149	Clooney	Donegal	cSAC	West of Ardara/Maas Road	-	197
150	Roshin Point	Donegal	cSAC	West of Ardara/Maas Road	Present	197
151	Lettermacaward	Donegal	cSAC	West of Ardara/Maas Road	Present	197
152	Rutland Island	Donegal	cSAC	Rutland Island and Sound	-	2283
153	Keadew	Donegal	cSAC	Gweedore Bay and Islands	Present	1141
154	Cruit Lower	Donegal	cSAC	Gweedore Bay and Islands	-	1141
155	Kincaslough	Donegal	cSAC	Gweedore Bay and Islands	-	1141
156	Carnboy	Donegal	cSAC	Gweedore Bay and Islands	Present	1141
157	Derrybeg	Donegal	cSAC	Gweedore Bay and Islands	-	1141
158	Gola Island	Donegal	cSAC	Gweedore Bay and Islands	-	1141
159	Lunniagh	Donegal	cSAC	Gweedore Bay and Islands	Present	1141
160	Dooey	Donegal	cSAC	Ballyness Bay	Present	1090
161	Ballyness Bay	Donegal	cSAC	Ballyness Bay	-	1090
162	Rinclevan	Donegal	cSAC	Horn Head and Rinclevan	-	147
163	Dunfanaghy	Donegal	cSAC	Horn Head and Rinclevan	Present	147
164	Marble Hill	Donegal	cSAC	Sheephaven	-	1190
165	Ards	Donegal	cSAC	Sheephaven	Present	1190
166	Rosapenna	Donegal	cSAC	Sheephaven	Present	1190
167	Tranarossan	Donegal	cSAC	Tranarossan and Melmore Lough	-	194
168	Melmore	Donegal	cSAC	Tranarossan and Melmore Lough	-	194
169	Lough Nagreany	Donegal	cSAC	Lough Nagreany Dunes	-	164
170	Doaghmore	Donegal	cSAC	Lough Nagreany Dunes	-	164
171	Gortnatraw	Donegal	cSAC	Lough Nagreany Dunes	-	164

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[2] Site codes in brackets refer to adjacent sites, or in the case of dedesignated sites, sites that were originally considered as potential NHA's but did not satisfy the final selection criteria.

(*cont'd overleaf*)

Table 2.3 Updated list of Irish sand dune sites (*Cont'd*)

	Dune System	County	Designation[1]	Site Name	Associated Saltmarsh	Site Code[2]
172	Magheradrumman	Donegal	cSAC	Ballyhoorisky Point to Fanad Point	-	1975
173	Ballymastocker	Donegal	cSAC	Ballymastocker Dunes	-	1089
174	Fahan	Donegal	cSAC	Lough Swilly	Present	2287
175	Crummie's Bay	Donegal	cSAC	North Inishowen Coast	-	2012
176	Lenankeel	Donegal	cSAC	North Inishowen Coast	-	2012
177	Tullagh	Donegal	cSAC	North Inishowen Coast	-	2012
178	Doagh Isle	Donegal	cSAC	North Inishowen Coast	-	2012
179	Lag	Donegal	cSAC	North Inishowen Coast	-	2012
180	White Strand	Donegal	cSAC	North Inishowen Coast	-	2012
181	Culdaff	Donegal	cSAC	North Inishowen Coast	-	2012

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[2] Site codes in brackets refer to adjacent sites, or in the case of dedesignated sites, sites that were originally considered as potential NHA's but did not satisfy the final selection criteria.

At a number of sites, some areas of sand dune habitat, usually spatially separated from the main sand dune area and generally considerably smaller, were considered as sub-sites and the habitats therein given a separate conservation status assessment. The decision to treat such areas as sub-sites and assign separate conservation status assessments to the habitats there was usually due, not only to their isolation from the main sites, but to the different management conditions that frequently applied to the smaller areas. Because of their generally small areas and isolation from associated sites, they were often less well protected from agricultural and/or recreational pressures and were consequently of less conservation value. Retaining them within the larger areas and incorporating them into one overall conservation status assessment would often have had the affect of downgrading the assessment, thereby unjustifiably underrating the conservation value of the main site. Other sites include areas that are isolated from the main part of the site, but which are not treated as sub-sites. In these cases, examples of which include Mannin Bay (site 102) and Streedagh Point (site 137), the isolated areas are generally subject to similar management pressures as the main site area, and are of equal or similar importance for habitat conservation purposes.

In all cases, the subsites were included on the digital map of the site with which they were associated, and dealt with in the report for that site. However, because the conservation status of the habitats at the sub-sites were assessed independently of those at the associated larger sites, it was necessary to include them as separate entities, with separate site numbers, on the project database.

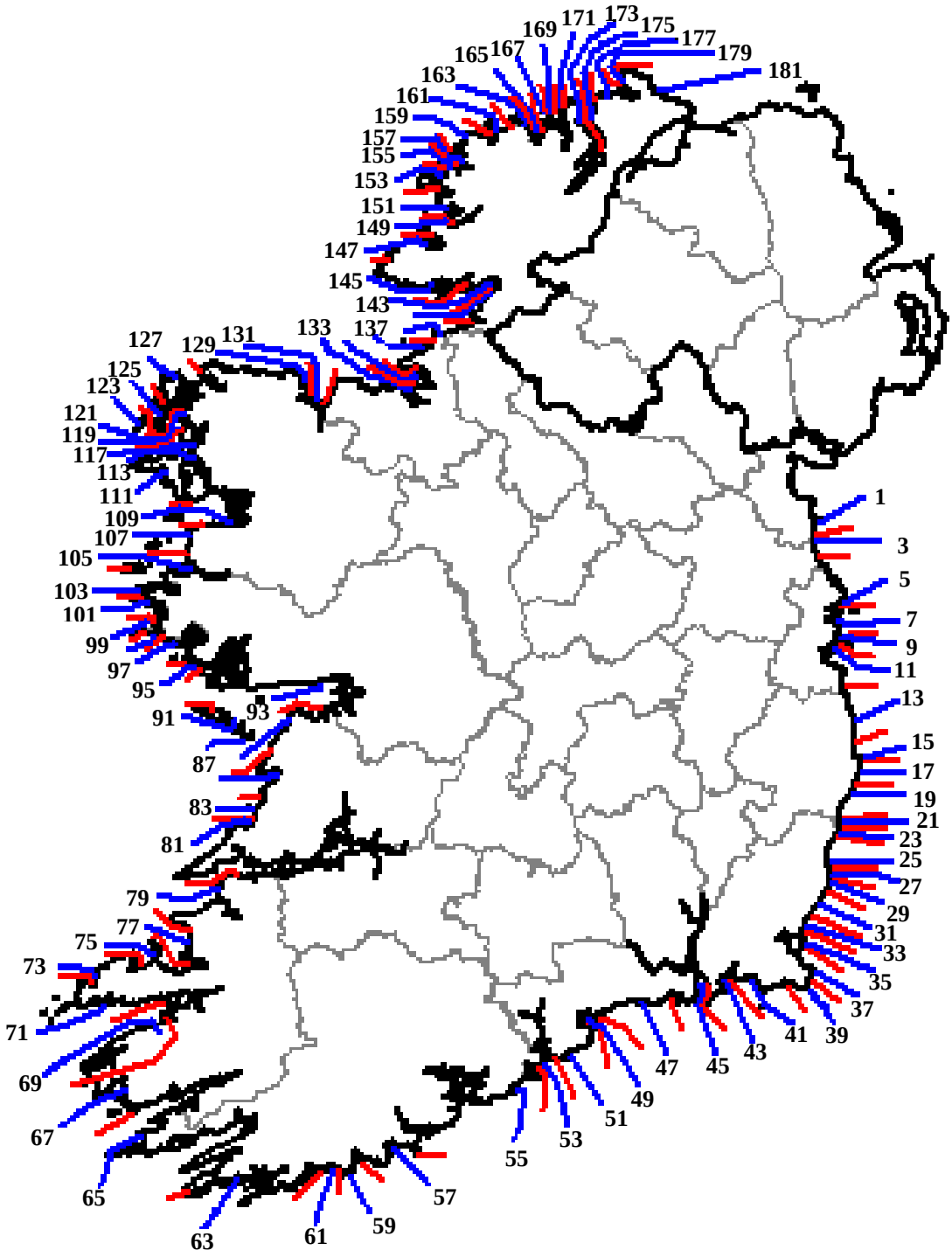

Figure 2.2 Location of Coastal Monitoring Project (CMP) Sites. For clarity, alternate lines are coloured blue or red, and where legible, only the blue lines are labelled with the site code. Site codes correspond with the site names inventory (Table 2.3), e.g. CMP site code 003 refers to Mornington, which is part of the Boyne Coast and Estuary cSAC 1957.

The list of sub-sites with site code numbers and the sites with which they are associated are shown in Table 2.4

Table 2.4 Sub-site names and code numbers and the sand dune sites with which they are associated

Sub-site name	Sub-site database number	Sand dune site	Site number
Rinnaun Point	200	Ross	130
Rathlackan	201	Lackan	129
Maghera Island	202	Maghera	147
Beldarra	203	Cross lough	126
Drom Hill	204	Fermoyle	74
Dunfanaghy Bay	205	Dunfanaghy	163
Inishkea South	206	Inishkea North	123
Trawboy East	207	Trawboy	117
Golf course	208	Barley Cove	64
Whitestrand	209	Barley Cove	64
West of Whitestrand	210	Barley Cove	64
Ballymacaward	211	Finner	140
Derryness	212	Sheskinmore	148
Mullaghmore	213	Trawalua	138
Bass Point	246	Tramore	46

2.2.3 Adaptation of JNCC Common Standards Monitoring guidance for sand dune habitats

The specific parameters that determine the conservation status of habitats are Range (only for national assessments), Area (extent), Structure and functions and Future prospects. The monitoring method employed in the current survey was devised with the aim of providing information on the last three parameters for Irish sand dune habitats, so that the conservation status of each Annex I habitat could be established both on a site-by-site basis and nationally. The method was based on the Common Standards Monitoring (CSM) guidance for sand dune habitats, developed by the JNCC (2004), which is set out in Appendix 2 of the present report. Details of the attributes used and the amended targets for each attribute are presented in sections 2.4.3.2.1 and 2.4.3.2.2 respectively.

The methodologies for assessing extent and future prospects in both the CSM guidance and the present survey were broadly similar. The determination of habitat extent was based in both cases on survey work using GPS (Global Positioning System) and the production of detailed GIS (Geographical Information Systems) maps, while future prospects assessments were based on apparent impacts and threats to the habitats. Range is not dealt with in the CSM protocol, as this assessment is not based on field surveys.

Structure and functions were also determined in each case from monitoring stops (assessment quadrats), in which prescribed targets were set for various different habitat attributes. However, due to the relatively depauperate nature of the Irish flora, differences between the Irish and UK sand dune floras, and the lack of substantial baseline information on Irish sand dune sites on which definitive targets could be set, the targets for several attributes were modified to varying degrees from those advised in the CSM document to suit the Irish situation.

The principal differences between the methods employed here and those of the CSM are discussed in Chapter 4 of the present report.

2.3 FIELD SURVEY

2.3.1 Pre-survey Preparations

Prior to site visits, information in the site packs was studied. Areas of interest were noted along with the locations of rare plants etc. Aerial photographs of the sites were examined. Structured walks (i.e. predetermined routes that appear to cover the range of habitat diversity at a site), along which monitoring stops were positioned, were generally planned with the advice of NPWS staff. Previous knowledge and/or interpretation of aerial photographs help to determine the most appropriate structured walk route to be taken at each site. At some sites, two or more individual structured walks were required. This mostly applied to larger sites where the main areas of interest were located in zones with different management regimes, or where they were separated by damaged or developed areas that were of little interest to the survey.

The numbers of monitoring stops in each habitat were also pre-planned, although the final number of stops may change based on observations made throughout the site visit.

The numbers and locations of monitoring stops were planned with the aim of adequately representing the range of vegetation structure and functions, and covering variation in management units within a site, e.g. if there were both grazed and ungrazed areas within a dune grassland, stops were placed in each area, generally in approximate proportions to the areas they represented.

Occasionally monitoring stops were not carried out in the assessment of habitat structure and functions: a common example is where habitats may be so small and homogenous in vegetation composition and structure as to make a simple visual assessment sufficient. This most often applies to the more ephemeral habitats, particularly *Annual vegetation of driftlines*, where in an ideal situation, an adequate cover of one or a few typical species, without a negative indicator species component, can be rapidly visually assessed, without the need for monitoring stops.

There were also instances where badly damaged habitat, such as dune grassland that has been severely affected by agricultural improvement is quite uniformly damaged, to the extent that it can be assumed that structure and functions will be *unfavourable-bad*.

Access difficulties at sites, or parts of sites may also have prevented the completion of a full complement of monitoring stops.

Transects, which involve a measurement of the width of each sand dune habitat at particular locations, were used in assessing habitat zonation and extent. In an ideal situation, in which a full range of sand dune habitats are present, a transect consists of mapping points taken at the seaward boundary of each habitat, initially at the strandline, followed by embryonic dunes, and so on until the landward boundary of the whole dune system is reached. An adequate number of transects, carried out at appropriate locations, will provide sufficient data for mapping the extent and zonation of habitats at the sites.

Transect positions were planned, although difficulties in determining details of narrow coastal zones on aerial photographs can often lead to on-site modifications of transect positions during the field survey. However, pre-planning of transect locations is not of critical importance, as appropriate positions for these (in sufficient numbers and at regular intervals) can be easily determined while traversing the site. Random mapping points on habitat boundaries, taken in sufficient quantities, can serve the same purpose as transect points, and were used either instead of, or in conjunction with transect points.

2.3.2 Survey

The main steps involved in the site survey were:

1. Recording of mapping transects
2. Structured walk – printed aerial photographs or aerial photographs uploaded to the GPS handset were used to follow the walk route and monitoring stops
3. At each monitoring stop the relevant habitat fieldcard details were completed and data recorded on the GPS. Target notes were also used to describe the general habitat and any additional information to aid mapping
4. GPS points were taken at boundaries between sand dune habitats
5. Habitat mosaics were noted and information points recorded on the GPS
6. Large areas of bare ground and scrub species such as *Hippophae rhamnoides*, etc were logged as areas on the GPS
7. Digital photographs were taken and relevant information recorded on the GPS system
8. Locations of other miscellaneous data, such as rare or notable species, areas of localised dumping or burning, access points and car parks etc. were logged as points on the GPS

2.3.2.1 Data Collection

The survey data were recorded on:

- Fieldcards
- Global Positioning System (GPS) device
- Field notes
- Printed aerial photographs

2.3.2.2 Fieldcard

The fieldcards used in the survey are shown in Appendix 4. The cards were used to record site details, monitoring stop data, and impacts of threats and management practices.

2.3.2.3 Global Positioning System (GPS)

A GeoExplorer handheld GPS minicomputer (Trimble GeoXT) was used for recording the locations of the following:

- Monitoring stops
- Transect zones and mapping points
- Boundary lines and areas
- Photographs
- Access roads and tracks
- Miscellaneous points of interest

The positions of features were logged on the GPS receiver, which computes the GPS position and stores the information in a file using proprietary Terrasync software (Trimble). Additional comments on features were also stored as text fields in the device. The system uses satellites to calculate a position on earth, by measuring the distance of that position from a group of satellites orbiting the earth at a very high altitude. Distances are measured using the travel time of radio messages emitted from the satellites.

2.3.2.4 Field notes

In addition to the data collected on fieldcards (Section 2.3.2.2), field notes relating to various aspects of site topography, vegetation composition and management etc., were written at all sites, with a view to providing information for site reports. The field notes typically included information on the site flora, including scrub species, mosses and lichens, and management issues such as livestock numbers, recent grazing history, fencing within the dunes, and locations of access roads and tracks.

2.3.2.5 Aerial photographs

Aerial photographs of the sites from the most recent complete, or near complete, set (the 2000 Ortho-photo set) were printed and used in the field as an aid to mapping and the execution of the pre-planned survey protocols. The intended locations of monitoring stops were usually drawn on the aerial photographs prior to the commencement of site surveys to ensure that the pre-planned stops were positioned satisfactorily. Using the printed aerial photographs in conjunction with the GPS handset, on which the aerial photographs were uploaded, ensured that intended locations could be accurately identified.

There were a number of sites, including several on west coast islands such as Mweenish Island (site 095) and Inishbofin (site 106), for which there were no photographs in the 2000 set of aerial photographs. In some of these cases, aerial photographs of the sites from the 2005 series were available, and were used in place of the omitted 2000 images.

2.4 CONSERVATION STATUS ASSESSMENT OF EU ANNEX I HABITATS

The conservation status assessments of habitats were assessed on both an individual site level and the national level (Table 2.2). In both cases, the overall conservation status of habitats was based on the combination of favourable (green), unfavourable-inadequate (amber) and unfavourable-bad (red) judgements assigned to the individual parameters of the assessment. At the individual site level, these were area (extent), structure and functions and future prospects, while on a national level, habitat range was also included in the assessment.

2.4.1 Habitat Range

In assessing the conservation status of each habitat at a national level, as part of the reporting obligations outlined in Article 17 of the Habitats Directive, it was necessary to include an assessment of Range for each habitat. Range defines the distribution of habitats throughout a geographical region, and was assessed by means of comparison with the previous inventory of sand dune sites (Curtis, 1991a) and any relevant historical data.

2.4.2 Habitat Extent

The assessment of habitat extent is based on stability over the monitoring period. If a habitat has been stable – with loss and expansion in balance – or increasing, then conservation status is assessed as *favourable*. A decline in area of up to 1% per year within a reporting period will result in a conservation status assessment of *unfavourable – inadequate*, while any greater rate of decline implies a conservation status assessment of *unfavourable – bad*. As the current survey represents the initial application of the methods described herein, there are no previous directly comparable habitat extent data. In the absence of appropriate baseline data, a number of sources such as the site MPSU maps, NHA file habitat maps, comments and observations in the NATURA 2000 file explanatory notes, and occasionally, unpublished information received from conservation staff or other people familiar with the sites, were used in estimating recent changes in extent. The site 6'' maps were also used (and are included as a theme on the site digital maps).

As the current data are based on more exacting standards of measurement (specifically the use of very accurate GPS measurements), than those employed in the previous above named surveys, large discrepancies in habitat areas between the present results and those included in the other reports were not necessarily taken as evidence of a genuine change in the habitat.

Assessment of the causes of habitat loss must also take account of the natural changes that are inherent in dynamic dune systems. Monitoring should also aim to identify trends that can indicate the causes of change, e.g. a loss or gain of habitat over several sites along a stretch of coast may, in certain cases, be at least partly attributable to impacts such as the installation of coastal protection measures in or near that area.

Structures that can affect functionality and sediment supply in sand dune systems, such as training walls or coastal protection installations such as groynes and revetments, were noted. Some of these, such as harbours, were visible on aerial photographs. Others however, such as narrow bands of rock armour or gabions, were not easily visible on the aerial photographs. These were noted from on-site observations. The extent of various protection features were logged on the GPS system and included on digitised maps.

Measuring habitat extent also generates data on habitat zonation. Zonation is a fundamental attribute of dynamic sand-dune systems, and the presence of a range of habitats with distinct transitions is desirable. Typically this involves strandline habitat forming in front of embryonic and mobile dunes, followed by fixed dune grassland, within which may be found humid dune slacks or dune heath. The issue may be complicated in fixed dunes by the presence of semi-fixed dunes, which can be quite extensive, form a mosaic or be difficult to clearly define.

2.4.2.1 Mapping Transects and Boundary Points

Data used in measuring habitat areas and boundaries were generated by the use of line transects and random boundary marker points. Line transects were placed at regular distances throughout the site, although greater numbers were generally used in areas of more complex habitat zonation. The total number of transects generally depends upon the size and complexity of the site. Transects extend - in an ideal scenario - from the strandline, through embryonic, mobile, semi-fixed and fixed dunes to the

transition to a landward feature such as a golf course, agricultural field or other non-dune habitats. The point at which the transect crosses each zone (boundaries between habitats) is recorded on the GPS. Random GPS positions are also taken on habitat boundaries and site boundaries throughout the sites, in order to increase the accuracy of the maps produced. Through collecting data on habitat boundaries, and the production of habitat maps, information on habitat zonation is generated.

Smaller habitat areas, such as dune slacks, were sometimes assessed by the use of the GPS *habitat area* function, whereby points on the habitat boundary were logged, until enough were obtained to produce a sufficiently accurate shape. The final portion between the first and last points logged closes automatically to produce a closed area shape for the habitat. Alternatively, numerous habitat boundary points were used in conjunction with transects to delineate habitat mosaics such as those in which dune slacks and fixed dunes co-exist.

Areas occupied by scrub species such as *Hippophae rhamnoides* (Sea Buckthorn) or recent developments such as houses or caravan berths, are recorded using the area function of the GPS system. This facilitates their exclusion from the surrounding habitats, and increases the accuracy of habitat extent measurements.

2.4.2.2 Determination of Habitat Area Loss

In order to approximate a figure for the total loss of area sustained in each habitat since 1996 (the date chosen as the baseline against which all perceived losses of extent up to the present time were estimated), the current habitat areas at sites where losses were thought to have occurred, i.e. those that were assessed as amber or red for extent, were multiplied by certain minimum or maximum adjustment factors according to the estimated magnitude of the loss of area. Losses of extent, or perceived losses of extent at the sites were not quantifiable, so the assessments were generally the result of best expert judgements.

Where sites were adjudged to be *unfavourable-inadequate* (amber) for extent, the decline in area must be greater than 0%, but less than 1% per year (or up to 10% over 10 years). Therefore, multiplying the current extent of such a habitat by 1.01 produces an estimate of the minimum extent it may have had at the site ten years ago, while multiplying by 1.09 estimates its maximum extent ten years ago. Subtracting the current extent from the adjusted figure produces an estimate of the area lost in the habitat at the site over the ten-year period.

Habitats adjudged to be *unfavourable-bad* (red) for extent are deemed to have lost at least 10% of their total area over ten years, indicating that the minimum former extent can be estimated by multiplying the current extent by 1.10. A middle and upper adjustment of 1.15 and 1.2 respectively were also used for estimating the former areas of *unfavourable-bad* habitats, although the upper figure was revised upwards where appropriate, as there need not be any limit to the area lost from an *unfavourable-bad* site. The total loss of area in each habitat was estimated by adding the individual losses from each site.

2.4.3 Habitat Structure and Functions

Vegetation structure and functions parameters were assessed from data gathered at a number of monitoring stops located along structured walks.

2.4.3.1 Structured walks

Structured walks – which define the location of monitoring stops generally follow a zigzag route with several straight lines, each obliquely traversing the full width of the site. The route of the structured walk was predetermined by examining the aerial photograph of the site with, where possible, input from NPWS staff who were familiar with the site. Monitoring stops were positioned at regular intervals along the structured walk in order to assess the condition of the site. The exact number of lines depended on the size and complexity of the dune system. In a relatively intact dune system with good habitat zonation, the structured walk would typically begin with a strandline stop, followed by embryonic, mobile and fixed dune stops until the landward site boundary was reached. The next 'arm' of the walk then led back to the strandline, and encompassed further monitoring stops in the order: fixed dunes, mobile dunes, embryonic dunes and strandline. This process continued until the full length of the site had been covered and all planned monitoring stops carried out. Alternatively, one fieldworker covered all the stops in one habitat, while another was responsible for those in other habitats. In such cases it was important that the pre-planned approximate locations of stops were recognisable in the field and adhered to.

It may become apparent during the field survey that the number of pre-planned stops requires adjustment. For example, dune slacks are not always clearly visible on aerial photographs. These may be discovered on the outward walk. Any necessary additional stops required to assess these may be carried out on the return journey. Flexibility to modify the route according to conditions observed during the survey is assumed. This may occur where, for example, an area in fixed dunes appears from aerial photographs to have been greatly modified by agricultural practices and seem to be no longer of interest, but during the survey may be found to have maintained its value as fixed dune grassland. Initial observations made at the starting point of the structured walk often influence the approach taken, e.g. it may become clear on arrival at a site that foredune habitats are largely absent, perhaps due to recent erosion, with the consequence that the planned numbers of monitoring stops are reduced.

However, because of the distinct lack of previous information that existed for most of the survey sites, it was necessary to adopt a more extensive approach, which involved the surveyors covering as much of the site area as possible, in order to map habitats and record activities and impacts as accurately and comprehensively as possible in the time allotted. The regularity with which previously unmapped or unreported dune slacks were located in sand dunes illustrated the necessity to stray from the planned route as frequently as possible. The use of GPS equipment with uploaded aerial photographs ensured that the surveyors could always locate and return to the planned monitoring stop locations.

2.4.3.2 Monitoring stops

At each monitoring stop, vegetation structure and function attributes are assessed. The stops consist of $4m^2$ quadrats, although in the case of semi-fixed dunes, the initial 2m x 2m area was sometimes expanded to 4m x 4m and note taken of any additional species occurring in the greater area. Issues regarding the mapping of semi-fixed dunes are discussed in Chapter 4.

As the categories of conservation status assessment are based on a cutoff point of 25 (i.e.< 25% = *unfavourable – inadequate*, > 25% = *unfavourable – bad*), the monitoring stops were, as a general rule, carried out in multiples of 4. For example, the number of stops used in fixed dunes was either 4, 8, 12, 16 etc., according to habitat area, and existence of different management regimes within a site etc. This allowed for simple estimates of conservation status, and produced a consistency of application at all of the sites.

If 8 stops were carried out in a particular habitat, then all 8 would have to pass the necessary criteria for the habitat to attain an overall pass. If either 1 or 2 stops fail, then the failure rates – at 12.5% and 25% respectively – would indicate an *unfavourable – inadequate* conservation status. Should more than 2 stops fail, it would indicate a failure rate of at least 37.5% and give an *unfavourable – bad* structure and functions conservation status assessment to the habitat.

In some instances – usually when habitats are very limited in size – less than 4 stops was carried out. In these cases the percentage of passes and fails is still used to yield the appropriate conservation status assessment, e.g. where 1 of only 2 stops failed, the habitat was regarded as *unfavourable – bad*. It may be assumed in these cases where habitat areas were small and homogenous in vegetation composition, the monitoring stop numbers and locations were selected to faithfully represent the habitat, so that in the above example, approximately 50% of the habitat area is thought to be in bad condition.

Due to the large areas and unknown or uncertain distribution of habitats at some sites, monitoring stops may have been pre-planned in the expectation of encountering areas of a particular habitat that were subsequently shown (during the site visit) to be absent. In these cases, the total number of stops will be less than the intended number but should still be adequate.

Monitoring stops provisionally assigned to a certain habitat may, following a full review of the field survey and re-evaluation of assumptions made during site visits, have been included under a different habitat. This would generally have skewed the allocation of monitoring stops away from the multiples of four assigned to each habitat during the planning stage. This was not a common scenario, but may have applied in a few cases at fixed dune/machair boundaries, where the precise demarcation of habitats tends to be more subjective than is the case for other habitat boundaries.

At some sites, particularly some of the larger ones, fieldworkers may have been separated by considerable distances, which, when combined with unreliable mobile phone coverage, may have made the management of fieldwork, including the application of monitoring stops, difficult to co-ordinate. Rather than deleting a number of recorded monitoring stops to bring the total number of stops to the nearest multiple of four, it was usually thought more constructive to retain the full complement of completed stops.

2.4.3.2.1 Habitat Attributes

The vegetation structure and function attributes, with the habitats to which each attribute applies in parentheses after the headings, are as follows:

Typical Species (All Habitats)
The typical species for each habitat are listed in Appendix 3 and have been adapted from the JNCC guidance documents, to produce lists that are more appropriate for use in Ireland, e.g. *Carex nigra* (Common sedge), *Eleocharis uniglumus* (Slender spike-rush) and *Juncus articulatus* (Jointed rush) have been added to the typical species lists for humid dune slacks, while *Anthyllis vulneraria* (Kidney vetch) has been added to the list of fixed dune species. Minimum target numbers depend on the typical vegetation composition diversity associated with the habitats.

Negative indicator species (All Habitats)
The most common negative indicator species on sand dunes are scrub and nitrophilous species, and they may be indicative of undesirable trends such as inappropriate grazing regimes or agricultural enrichment of dune grassland. Common scrub species include *Hippophae rhamnoides* (Sea buckthorn) and *Rubus fruticosus* (Bramble), while *Pteridium aquilinum* (Bracken) is a common invasive species in dune grassland. Nitrophilous species, or those associated with agricultural enrichment, commonly include *Senecio jacobaea* (Common ragwort), *Cirsium arvense* (Creeping thistle) and *Urtica dioica* (Nettle). The lists of species forming the basis of the attribute target for each habitat are included on the fieldcards in Appendix 4. Occasionally, the boundaries of larger stands of negative species were mapped using GPS points, although there were no fixed thresholds for either extent or density, beyond which it was deemed essential to produce a mapped boundary.

Health/Flowering and Fruiting (Embryonic dunes; Mobile dunes)
This attribute describes the condition of the plants in the foredunes. The assessment is based on the health and flowering/fruiting of foredune grasses. Poor condition and lack of flowering are usually indicative of sediment starvation. The evaluation of plant health includes an assessment of the robustness of stems and presence of dead or dying material. The habitat is considered healthy if the plants (*Elytrigia juncea* and *Leymus arenarius* in the case of embryonic dunes and *Ammophila arenaria* and *L. arenarius* in mobile dunes) are green and/or flowering, and unhealthy if over 5% of plant material was brown and dying.

Bare Ground (Machair, Fixed Dunes, Humid Dune Slacks & Dunes with S. repens)
Bare ground is essential for pioneer species, dune annuals, invertebrates etc. in fixed dunes; and a cycle of small-scale erosion and re-colonisation is normal in healthy dune habitats. However, there are prescribed limits for bare ground, beyond which it is likely to reflect poor habitat condition. The upper limit of bare ground in monitoring stops is set at 10% in machair, fixed dunes and dunes with *Salix repens*, while for dune slacks the limit is 5%. Aerial photographs are also useful in assessing bare ground, as tracks and large blowouts are usually readily recognisable. However, although such is the dynamic nature of sand dunes, and as the aerial photographs used in the survey were produced in 2000, they could not be assumed to reflect the current situation at the sites. Such information can be revealing as to damaging activities at the sites.

Sward Height (Machair and Fixed Dunes)
A certain amount of short turf is desirable in dune grassland, as a rank, ungrazed sward tends to negatively impact on species diversity. A target of average sward

height of between 5 - 20cm was set for fixed dune monitoring stops. The percentage cover of short turf (i.e. in the range 5-20 cm height) and cover of tall Marram, although these are not currently part of the attribute assessment, were recorded at each stop. Pending a full review of the sward height status at each site, the target may yet be set on an individual site basis, to take account of land use and possible grazing management regimes etc. The desired sward height may also vary where habitat mosaics in fixed dune are a feature, e.g. a grazing regime that maintains a high degree of short turf may not be ideal where dune heath is found throughout the fixed dunes.

Condition of Salix repens (Dunes with Salix repens)
This attribute refers to the density and height of *Salix repens*. The dunes with *Salix repens* category is described as slack habitat where *Salix repens* is dominant and forms a bushy canopy. The target cover of *Salix repens* is set as >10% and the target height ranges from 5 to 30cm. Less than 5cm and greater than 30cm would, in general, indicate undergrazing and overgrazing, respectively.

Cover of broad-leaved grasses (Dunes with Salix repens)
An excessive cover of broad-leaved grasses such as *Holcus lanatus*, *Dactylis glomerata* and *Arrhenatherum elatius*, would indicate a shift towards an ungrazed, tussocky sward. The target for the combined cover of these grasses is set at <10%.

Scrub/Trees (Dunes with Salix repens)
An excess of scrub/trees cover in the habitat can indicate a problem, particularly if grazing levels are not sufficient or if scrub control is not being carried out. The target is set at no greater than 5% cover in each monitoring stop.

Ratio Forbs[5]/Grasses (Humid Dune Slacks)
Drying and eutrophication of dune slacks can be indicated by increases in the cover of grasses. The limit of grass cover in each monitoring stop is <70%, while forb cover should be greater than 30%.

Cover of Salix repens (Humid Dune Slacks)
If the cover of *S. repens* in a dune slack exceeds 40%, it is thought likely to become a problem, in the absence of an appropriate grazing regime or scrub control measures.

2.4.3.2.2 Targets of Habitat Attributes
The vegetation structure & function attributes used for each Annex I sand dune habitat, with the minimum requirements (targets) for each attribute, are shown below. Lists of typical species and negative indicator species are included on the habitat field cards (Appendix 4).

Annual vegetation of driftlines (1210)
The 2 habitat attributes, with minimum target requirements are:
- *Typical species* – 1 species at least occasional (≥1%)
- *Negative Indicator species* – singly or together not exceeding 5% of area

Both attributes must pass for a stop to attain an overall pass.

[5] Forbs are defined as any non-woody herbaceous species

Perennial vegetation of stony banks (1220)
The monitoring protocol for *Perennial vegetation of stony banks* has yet to be finalised. Information has been gathered on the following attributes:

- *Typical species* – species present noted
- *Negative Indicator species* – presence and abundance of species not normally associated with the habitat noted

Lichen cover is also noted as it is an indicator of more stable shingle habitats.

The presence of man-made structures such as rock armour is also noted as these can impact on the natural migration of shingle habitats. This is used in the assessment of the future prospects of the site.

Embryonic shifting dunes (2110)
The 3 habitat attributes, with minimum target requirements are:

- *Typical species – Elytrigia juncea* and/or *Leymus arenarius* singly or together at least occasional (≥1%)
- *Health/Flowering & Fruiting* – Unhealthy *E. juncea* and/or *L. arenarius* singly or together no greater than 5%
- *Negative Indicator species* – non-natives no more than rare. Negative indicator species singly or together not exceeding 5% of area

All 3 attributes must pass for a stop to attain an overall pass.

Shifting dunes along the shoreline with Ammophila arenaria (2120)
The 3 habitat attributes, with minimum target requirements are:

- *Typical species – Ammophila arenaria* and/or *Leymus arenarius* singly or together to at least frequent (+25%)
- *Health/Flowering & Fruiting* – Unhealthy *Ammophila arenaria* and/or *Leymus arenarius* singly or together no greater than 5%
- *Negative Indicator species* – non-natives no more than rare. Negative indicator species singly or together not exceeding 5% of area

All 3 attributes must pass for a stop to attain an overall pass.

Fixed dunes with herbaceous vegetation (Grey Dunes) (2130)
The 4 habitat attributes, with minimum target requirements are:

- *Typical species* – 6 species present
- *Negative Indicator species* – non-natives no more than rare. Negative indicator species singly or together not exceeding 5% of area
- *Flowering and Fruiting* – at least 20%
- *Bare ground* – not exceeding 10% of area
- *Sward height* – average sward height in monitoring stop no greater than 20cm and no less than 5cm

At least 4 attributes must pass for a stop to attain an overall pass.

Although not forming part of a target attribute, total lichen cover was also measured in each stop, as a means of identifying acidic fixed dune habitat. Also noted at each

site was the overall % cover of scrub species in this habitat. The total cover should be no greater than 5%.

Decalcified fixed dunes with Empetrum nigrum (2140) & Atlantic decalcified fixed dunes (2150)

Preliminary survey results clearly indicated that using the JNCC monitoring protocol for dune heath habitats would not be feasible. In general, the habitats in Ireland appear to be characterised by a significantly less diverse range of species, and such is the scarcity of the two habitats in Ireland, that it was necessary to collate all survey data before a meaningful review of the national resource of the habitats could take place. The need for a dedicated survey of the habitats in Ireland has been established. In the current survey, structure and functions were deemed to be *favourable*, when there was no significant damage from harmful activities such as overgrazing. The issues regarding the habitats are discussed further in Chapter 4.

Dunes with Salix repens (2170)

The 6 habitat attributes, with minimum target requirements are:

- *Typical species* – 4 species present
- *Bare ground* – not exceeding 10% of area
- Condition of Salix repens - Salix repens at least frequent and 5-30cm tall
- *Cover of broad-leaved grasses* – combined cover less than 10%
- *Negative Indicator species* – singly or combined, not exceeding 5% of area
- Scrub/trees – less than 5% cover

At least 4 of the 6 attribute targets must pass

Humid dune slacks (2190)

The 6 habitat attributes, with minimum target requirements are:

- **Typical species* – 4 species present
- *Bare ground* – Not exceeding 5% of area
- *Ratio Forbs/grasses* – forbs ≥30% and grasses ≤ 70%
- *Cover of Salix repens* – no greater than 40%
- *Negative Indicator species* – singly or combined not exceeding 5% of area
- *Scrub* – scrub species (not including *S. repens*) not exceeding 5% of area

At least 5 of the 6 attribute targets must pass

*Where possible, dune slack habitat at each stop was also assigned to slack type, i.e. pioneer, wet, dry, and dry mature, for each of which a separate sub-list of typical species applies.

Machair (21A0)

The 6 habitat attributes, with minimum target requirements are:

- *Typical species* – 6 species present in dry machair; 4 species present in wet machair
- *Negative Indicator species* – non-natives no more than rare. Negative indicator species singly or together not exceeding 5% of area
- *Bryophytes* – always at least occasional
- *Flowering and Fruiting* – At least frequent; percentage cover recorded

- *Bare ground* – not exceeding 10% of area
- *Sward height* – species-rich turf >8cm.

At least 5 of the 6 attributes must pass for a stop to attain an overall pass.

Also noted was the percentage cover of short turf in each stop, and where relevant, the boundaries of fenced fields and type of grazing within each field.

2.4.4 Future prospects

On considering the overall affect of all impacts and activities, the future prospects of each habitat are rated as *favourable*, *unfavourable – inadequate*, or *unfavourable – bad*, and are, in conjunction with habitat extent and vegetation structure and functions, used to assign an overall conservation status assessment for each habitat. When the habitat is not thought to be under significant threat from the observed impacts, such that its long-term viability is assured and future prospects are excellent or good, then it is assessed as being in *favourable* condition. When under severe threat and rapidly declining from the net affect of impacts at the sites, habitats are assessed as *unfavourable – bad*. These habitats have bad long-term prospects and no assurance as to their long-term viability. Any scenario, in which the future prospects of habitats are thought to fall between the above extremes, leads to an *unfavourable – inadequate* assessment.

In the National conservation status assessment report for Annex I habitat types, a distinction was made between pressures – the impacts that are currently affecting the site, and threats – those that are likely to detrimentally affect the sites in the future.

2.4.4.1 Impacts and Activities

The future prospects for Annex I sand dune habitats at each site were based on an assessment of the threats posed or potential benefits likely to accrue from various impacts and activities. These included management regimes such as coastal protection works and beach cleaning; recreational activities such as walking and horse-riding; agricultural practices such as overgrazing and stock feeding; and potential developments etc. Most recorded impacts refer to activities taking place within the sand dune systems: in the case of designated sites, activities referred to as originating from outside are those that occur outside of the designated area; while for non-designated sites, activities that originate beyond the mapped dune area are considered to be ‘outside’ impacts. The great majority of impacts listed refer to those observed during site visits, while additional data obtained from reliable sources, such as site management plans, are also included. A full list of the broad categories of Impacts and Activities likely to be encountered are included in Appendix 4. The list may be expanded as necessary in the future.

An assessment of each recorded or perceived impact, with an evaluation of the intensity of that impact and the area of each habitat affected was included for each site in the project database. The same information was presented in each individual site report. The intensity of the influence of each activity was rated as either A (= high), B (= medium) or C (= low). The positive or negative affect of the influence was indicated by the ratings: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence. A common example of a positive impact in dune grassland was the

existence of a sustainable grazing regime that helps to maintain a species-rich short sward, whereas overgrazing and intensive recreational pressures were among the more commonly encountered negative impacts.

The areas affected by each recorded impact at all of the sites were usually based on simple visual estimates. Occasionally, GPS mapping points formed the basis of some or all of the estimate of the area affected by an impact at a particular site, e.g. when large stands of invasive species – usually included under *invasion by a species* (954) - were mapped using the GPS area function, the area of that stand (automatically generated in the GIS data processing procedure), formed part or all of the estimated affected area for the impact.

Occasionally, when particularly large areas of habitat were affected by negative impacts, the areas were mapped and included as a polygon (shape) on the site digital map. A common example of this was the mapping of extensive areas of dune grassland dominated by *Hippophae rhamnoides* (Sea buckthorn). The locations of other impacts were sometimes identified by information points, which were also included on the site digital map.

Data were also gathered on methods of coastal protection employed at sites over recent decades. Over time, installations such as rock armour or gabions, can be covered over with trapped sand and may no longer be detectable in the field. Without prior knowledge, these and other coastal protection management strategies such as dune re-contouring and replanting may go unnoticed or unconsidered. This type of information may be important in understanding the present condition and future prospects of the sites.

2.4.4.2 Indicators of Local Distinctiveness

Also included under future prospects are *Indicators of local distinctiveness*, including any site-specific features, such as rare or notable plant species, or transitions between habitats, which are not adequately dealt with by other attributes. Threats to the future well being or viability of these attributes should be considered as negative factors in the appraisal of habitat future prospects.

2.5 OUTPUTS

2.5.1 Digitised Maps

The vegetation maps were created using GIS - Geographic Information System software (ESRI Arcview 3.2). The maps were based on the information recorded on the handheld GPS device during field surveys, and on additional observations recorded on the printed aerial photographs and in target notes. The information was transferred from the GPS device to the office computer. The data collected by the GPS receiver may be subject to errors caused by atmospheric noise etc. Corrections were applied to the data to account for such interference. Differential correction improves the accuracy of the positions to the specified accuracy of the GPS receiver. The data was corrected using the Rinex data, downloaded from the Geodetic services on the Ordnance Survey website (www.osi.ie). The data was then displayed using the GPS Pathfinder Office software. Any editing etc. was undertaken at this stage. This was then exported to Arcview 3.2 and the vegetation maps were prepared for each site.

These maps include the following information:

- Overall site designation boundaries
- Sand dune habitats
- Location and description of monitoring stops and transects
- Location and description of photographs
- Other relevant information, e.g. location and extent of negative indicators, location of rare plants, access roads, car parks, recent developments and location of threats such as dumping or burning
- The area of each habitat, as generated from analysis of the digitised maps

2.5.2 Site Reports

A detailed report was written for each individual site, based on monitoring stops data, measurements of habitat extent, the impacts and activities noted at the site, information recorded in field notes, and any other significant information available about the site, such as that contained in the relevant NATURA 2000 standard data form and explanatory notes or site management (MPSU) plan.

The following were included in each report:

- General site details (as for database general site details)
- General site description
- Description of Annex I sand dune habitats with habitat areas
- Impacts and activities in and around the site
- EU Conservation status assessment of all sand dune habitats at each site
- Conservation status under proposed Irish system of assessment

2.5.3 Database

The data recorded on the fieldcards for each site were inputted into the Project database. This database is referred to as the Coastal Monitoring Project Database and is supplied on digital media for use by NPWS staff. The information stored on the database for each site includes:

General site details: Site name, Site grid reference (the approximate centre point of the site), Survey date, County, Ranger area, Surveyors, Discovery map numbers, Aerial photograph numbers, Digital 6" map numbers, Site designations, Habitat areas (determined from final map).

Monitoring stop details: Stop numbers, Stop GPS co-ordinates, Habitat attributes with pass/fail or recorded values, Total number of stops, number of passed stops, and overall pass/fail estimate of attributes for each habitat

Impacts and threats: Activity (with codes used in NATURA 2000 Standard Data Form), including whether it occurs inside or outside the site, Habitat affected and area affected, Intensity of impact (A - High, B - Medium, C - Low or D – Unknown), Influence of impact (-2 High negative influence, -1 Moderate negative influence, 0 Neutral, + 1 Moderate positive influence, +2 High positive influence). Details of the codes for each activity are given in Appendix 4. When a sand dune site is within a cSAC or pNHA, an activity is regarded as occurring inside the site, if it originates within the designation boundary; and outside if it originates beyond the designation

boundary. At a non-designated site, inside refers to activities that originate within the sand dunes and outside refers to activities that originate outside of the dunes.

Conservation Status: The EU conservation status of each Annex I sand dune habitat at each site, comprising status of each component of conservation assessment - Extent, Structure & Functions and Future Prospects: A - Favourable; B – Unfavourable - inadequate; or C - Unfavourable – Bad

The conservation status of each Annex I sand dune habitat under an Irish system devised by NPWS: Favourable - Enhanced/Maintained/Recovered/Declining; Unfavourable - Recovering/ Unchanged/Declining; Destroyed - Partially destroyed/Completely destroyed; Unknown – If there is insufficient information

2.5.4 Site Photographs

The locations of photographs are marked on the digital map of each site. The photographs, along with explanatory text are supplied on digital media accompanying this report.

2.5.5 National Conservation Status Assessments

The conservation status assessment of each habitat on a national level was established and is presented in Chapter 3 of the report.

2.6 CONSERVATION STATUS OF HABITATS ON A NATIONAL LEVEL

For each individual site, the conservation status of extent was based on the estimated magnitude of habitat loss (or otherwise) over the reporting period. Structure and functions were generally assessed by means of the overall pass/fail ratio of monitoring stops and future prospects were assessed by evaluating the aggregate affect of all the observed or perceived impacts and threats to the habitats.

In order to assess the conservation status of the area, structure and functions and future prospects of habitats on a national level, the areas of each habitat in each of the three habitat conditions of favourable (green), unfavourable-inadequate (amber) and unfavourable-bad (red) were added to produce total national areas for each of the conservation categories e.g. the fixed dunes at both Aghleam (site 124) and Cross Lough (site 126) were adjudged to be unfavourable-inadequate (amber), based on the monitoring stops carried out at the two sites. The total fixed dune areas of the sites – 318.69ha in the case of Aghleam and 186.75ha in the case of Cross Lough - were then added, with all the other fixed areas from sites adjudged to be unfavourable-inadequate, to produce a total national area for unfavourable-inadequate fixed dunes. The same procedure was also carried out for favourable (green) and unfavourable-bad (red). A conservation status assessment of the habitat on a national basis was conducted following an evaluation matrix (Appendix 1).

Extent is considered favourable (green) on a national level, only if 100% of the total habitat area is green i.e. no loss of habitat since the Habitats Directive came into force. If the total loss comprises greater than 10% of the overall habitat area, extent is rated as unfavourable-bad (red). Any condition between these two is rated as unfavourable-inadequate (amber).

Structure and functions are considered favourable on a national level, when 100% of the habitat area is favourable (green). If the total unfavourable area (combining unfavourable-inadequate and unfavourable-bad) comprises greater than 25% of the overall habitat area, structure and functions are rated as unfavourable-bad (red). Any condition between these two is rated as unfavourable-inadequate (amber).

Future prospects are assessed as favourable on a national al level, when 100% of the habitat area is assessed as favourable (green). If the total unfavourable area (combining unfavourable-inadequate and unfavourable-bad) comprises greater than 25% of the overall habitat area, the future prospects are rated as unfavourable-bad (red). Any condition between these two is rated as unfavourable-inadequate (amber).

3. RESULTS AND DISCUSSION

3.1 PRESENTATION OF RESULTS

A considerable amount of data has been consolidated, in order to determine the overall conservation assessment of each Annex I sand dune habitat in Ireland. The data are contained in individual site reports.

In addition, the main impacts and activities that were recorded or were known to occur at each habitat are discussed. The monitoring stop attributes that were established are also discussed to critically review the appropriateness of the targets set in this protocol.

3.2 OVERALL ASSESSMENT OF HABITAT CONSERVATION STATUS

The conservation assessment of the main attributes – Range, Area, Structure & Functions and Future Prospects has been assessed as either *favourable, unfavourable-inadequate* or *unfavourable-bad* at a National level for each of the Annex I sand dune habitats. The overall habitat conservation assessment is based on a combination of the final assessment of the four attributes and an overview of the results, arranged in order of decreasing overall conservation status, is shown Table 3.1 The results for each habitat are shown separately in Figures 3.1-3.10 which includes a brief explanation behind the ratings assigned.

As this was a baseline survey, it is assumed that the distribution of each habitat as determined in this national survey is faithful to its overall Range and has, therefore, been considered *favourable* for Range. It should be noted however, that the assessment of the perennial vegetation of stony banks is restricted to areas of the habitat that are associated with sand dune systems alone, and that the habitat is far more widespread in its distribution, as indicated by Moore and Wilson (1999).

Table 3.1 National overview of the attributes assessment and the overall conservation status

Habitat Names	Range	Area	Structure and Functions	Future Prospects	Overall Conservation Assessment
Decalcified fixed dunes with *Empetrum nigrum* (2140)					
Annual vegetation of drift lines (1210)					
Perennial vegetation of stony banks (1220)					
Embryonic shifting dunes (2110)					
Shifting dunes along the shoreline with *Ammophila arenaria* (2120)					
Fixed dunes with herbaceous vegetation (2130)					
Atlantic decalcified fixed dunes (2150)					
Dunes with *Salix repens* ssp. *argentea* (2170)					
Humid dune slacks (2190)					
Machair (21A0)					

In terms of quantifying the status of the total national resource of a particular habitat, any loss of habitat is automatically rated as *unfavourable*. The threshold that has been set as part of the Habitats Directive is that a loss of less than 1% of habitat per year is rated as *unfavourable-inadequate* while a loss greater than 1% is considered *unfavourable-bad*.

The most recent set of aerial orthophotographs with full national coverage is the year 2000 series, which in terms of dynamic systems such as sand dunes are helpful. However, the resolution is such that it is not always possible to identify individual habitats, e.g. strandlines *vs* foredunes, or dune slacks *vs* dunes with *Salix repens*, or fixed dunes *vs* dunes with *Empetrum nigrum*. Much of the previous data was incomparable with the current dataset as there were few recently drawn maps depicting accurate boundaries of sand dune habitats using the EU Habitats Directive classification system.

During the survey, it was not always possible to quantify the loss or accumulation of a particular habitat. A comparison between the area of habitat that has previously been listed on the NATURA 2000 for Ireland and the area that was recorded during the current project is shown in Table 3.2. Much of the discrepancy is due to the fact that earlier reports and figures were estimated from hand-drawn maps and did not have the benefit of using relatively accurate survey data, which used GPS to delineate habitat boundaries. In other cases, vegetation may have been misclassified. Some of the less abundant habitats, particularly those that occur within vegetation mosaics have been greatly over-estimated e.g. decalcified fixed dunes with *Empetrum nigrum*. This habitat, whose ecological characteristics in Ireland were not fully determined during this project and whose distribution appears to be very limited, will require additional research to determine its status in Ireland.

Table 3.2 Comparison between the area of Annex I sand dune habitat listed in the NATURA 2000 database for Ireland and the overall area that has been recorded during the 2004-2006 survey

Habitat name	Habitat code	NATURA 2000 Area (ha)	CMP 2004-2006 Total resource (ha)
Annual vegetation of drift lines	1210	709	52.16
Perennial vegetation of stony banks	1220	2083.16	32.44
Embryonic shifting dunes	2110	949.88	171.51
Shifting dunes along the shoreline with *Ammophila arenaria*	2120	2011.09	405.65
Fixed coastal dunes with herbaceous vegetation	2130	5153.99	7060.58
Decalcified fixed dunes with *Empetrum nigrum*	2140	245.01	2.8
Atlantic decalcified fixed dunes	2150	568.7	77.81
Dunes with *Salix repens* ssp. *argentea*	2170	645.77	118.4
Humid dune slacks	2190	502.02	211.5
Machair	21A0	2387.70	2752.6

In assessing a habitat, it was only possible to suggest that there had been a loss/gain of a particular habitat based on best scientific judgement. In order to quantify the results, a mathematical approximation was developed following EU guidelines and used to estimate the loss of area. In terms of *unfavourable-inadequate* category, the three approximations assumed were 0.1%, 0.5% and 0.9% loss per year, all of which are less than the 1% threshold set by the EU guideline. In terms of *unfavourable-bad* category, the three assumptions were 1.1%, 1.5% and 2% loss of habitat per year. Therefore the final value for loss of area for a habitat at a site, within either the unfavourable-inadequate or unfavourable-bad category was accorded a value based on the approximate loss of habitat that was assumed to have occurred based on best expert judgement. The overall result is the sum of all the figures used.

Structure and Functions was largely assessed using monitoring stops, although as described later in this report, best scientific judgement was also used at sites where a particular habitat occurred, but where monitoring stops were not warranted owing to the condition or patchy distribution of the habitat. Any deviation from a pristine site results in an automatic assessment of *unfavourable-inadequate*. A threshold has been set in the EU guidelines, where 25% or more of the monitoring stops in any habitat fails, it is deemed to be *unfavourable-bad* and is indicative of a poorly functioning or poorly managed habitat.

The future prospects of a habitat at a site were often downgraded, based on best scientific judgement, where it was considered that there were some activities that are likely to threaten that habitat in the future. Thus the future prospects are automatically considered to be at least *unfavourable-inadequate*. Currently there is no set threshold in the EU guidelines to determine the assessment categories for a habitat's future prospects in terms of the projected intensity of the threatening activity. For the purposes of this project, where more than 25% of the habitat area was deemed to be at risk from the threat of damaging activities, the rating was adjudged to be *unfavourable-bad.*

The following is a summary of how the Overall Conservation Status of each of the Annex I sand dune habitats was determined during the current survey.

3.2.1 Annual vegetation of drift lines (1210)

The habitat was recorded from a total of 71 sites and occupied an area estimated at 52.16ha. The assessment of the main attributes, in terms of the total area assessed, is shown in Figure 3.1.

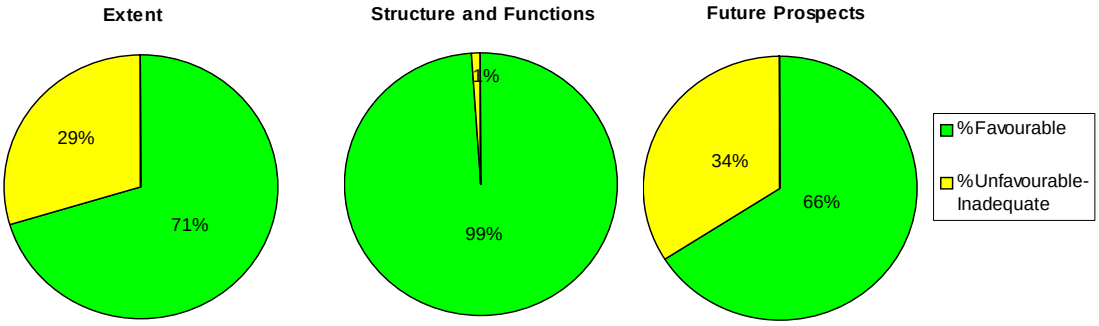

Figure 3.1 Conservation assessment for the attributes of the Annual vegetation of drift lines (1210) in Ireland (Percentage Area)

- The Natural Range of the Annual vegetation of drift lines is considered to be ***favourable***. The favourable reference range is defined by the current range of the habitat.
- It is estimated that the Area of annual strandline has declined by only 0.6% or 0.31ha in a ten-year reporting period (1996-2006). This attribute is assessed as ***unfavourable-inadequate***, which is due to anthropogenically induced changes in the pattern of tidal litter deposition e.g. beach cleaning, construction of coastal protection works and pedestrian traffic.
- The habitat Structure and Functions have been assessed as ***favourable***. None of the 97 monitoring stops failed the target criteria. Based on best scientific judgement, the habitat was rated as *unfavourable-inadequate* at 2 sites (or 1% of the total habitat area). However, this was not considered enough to fail the site or the habitat.
- Based on best scientific judgement, the Future Prospects are assessed as ***unfavourable-inadequate***.

The Overall Conservation Status for Annual vegetation of drift lines in Ireland is ***unfavourable-inadequate*** (Table 3.1).

3.2.2 Perennial vegetation of stony banks (1220)

The area of habitat assessed is 26.61ha, although the total national area is much greater. The assessment of the main attributes is shown in Figure 3.2.

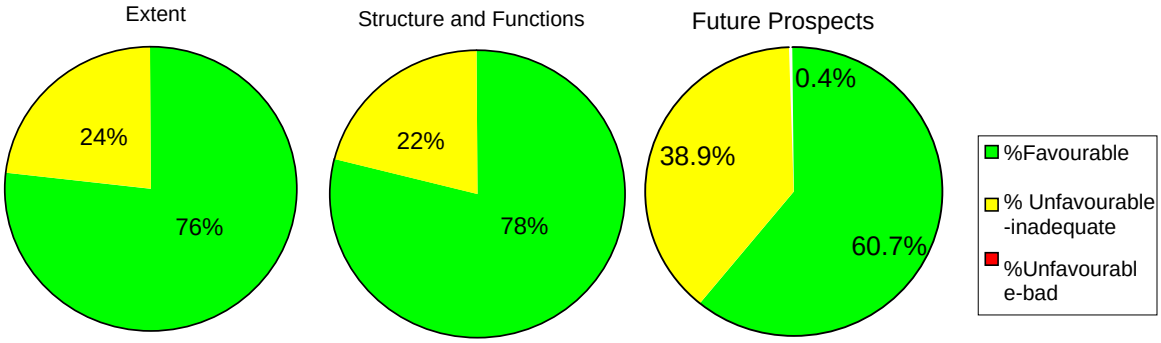

Figure 3.2 Conservation assessment of the main attributes for Perennial vegetation of stony banks (1220) in Ireland (Percentage Area)

- The Natural Range of Perennial vegetation of stony banks is considered to be ***favourable***. The favourable reference range (of habitat associated with sand dune systems) is defined by the current range of the habitat in Ireland.
- 24% of the Area of Perennial vegetation of stony banks habitat that was assessed is not favourable, resulting in ***unfavourable-inadequate*** assessment. The habitat has been estimated to have declined by 1.4% over the course of the ten-year reporting period (1996-2006). However, this does not take into account considerable volumes of shingle and cobble that were not assessed, nor of the habitat dynamics.
- The habitat Structure and Functions have been assessed as ***unfavourable-inadequate***. Although only 1 monitoring stop out of 73 failed to achieve the target criteria, 22% of the overall habitat area was adjudged *unfavourable-inadequate* as a number of sites, where the or extent of the habitat did not warrant monitoring stops, were assessed on best scientific judgement assessment.
- Based on best scientific judgement, the Future Prospects are assessed as ***unfavourable-inadequate***. This is largely due to the increasing number of man-made structures that have been installed that have an impact on the natural mobility of the substrate, such as coastal protection works and marinas, etc.

The overall conservation status for Perennial vegetation of stony banks in Ireland is ***unfavourable-inadequate*** (Table 3.1).

3.2.2 Embryonic shifting dunes (2110)

Recorded from 118 sites, the area of habitat that was assessed is 171.5ha. The assessment of the main attributes, in terms of the total area assessed, is shown in Figure 3.3.

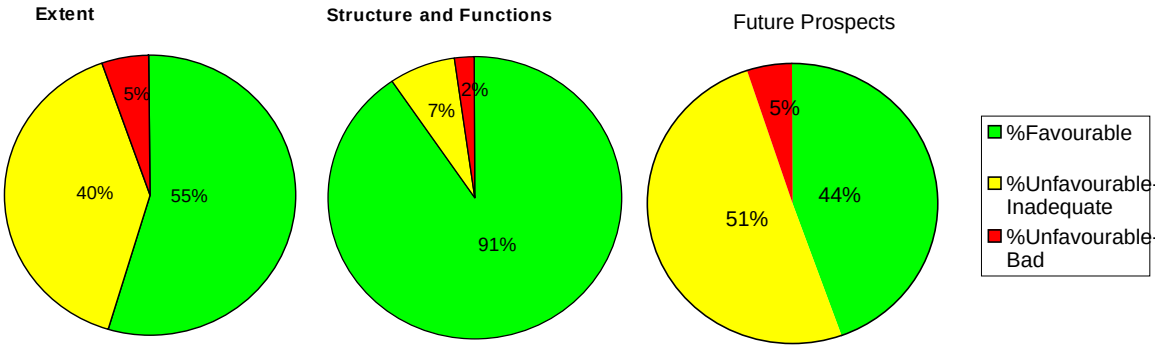

Figure 3.3 Conservation assessment of the attributes for the Embryonic shifting dunes (2110) in Ireland (Percentage Area)

- The Natural Range of Embryonic shifting dunes is considered to be ***favourable***. The favourable reference range is defined by the current range of the habitat.
- The Area of embryonic dune has declined by 2.72% or 4.8ha over the course of the ten-year reporting period (1996-2006). This attribute is assessed as ***unfavourable-inadequate***.
- The habitat Structure and Functions have been assessed as ***unfavourable-inadequate***. Of the 254 monitoring stops, only 9 stops failed to reach the target criteria. 91% of the habitat area is functioning naturally.
- 51% of the total habitat area is considered to be moderately susceptible to erosion or redistribution by storm tides while 5% of the total habitat area is extremely vulnerable. However, erosion is a natural phenomenon, therefore the Future Prospects are assessed as ***unfavourable-inadequate***.

The Overall Conservation Status for Embryonic shifting dunes in Ireland is ***unfavourable-inadequate*** (Table 3.1).

3.2.3 Shifting dunes along the shoreline with *Ammophila arenaria* (2120)
3.2.4

Widely distributed, mobile dunes were recorded at 141 sites around the country and are estimated to occupy 405.65ha. Of that figure 398.84ha was assessed. The assessment of the main attributes, in terms of the total area assessed, is shown in Figure 3.4.

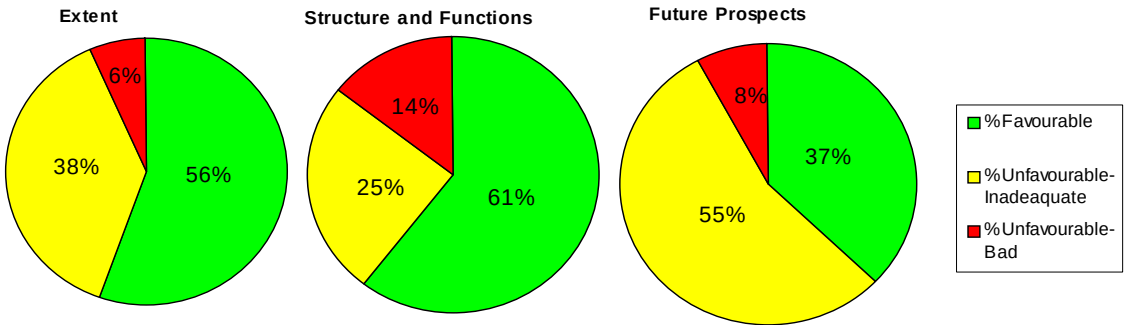

Figure 3.4 Conservation assessment of the main attributes of the Shifting dunes along the shoreline with *Ammophila arenaria* (2120) in Ireland (Percentage Area)

- The Natural Range of Shifting dunes along the shoreline with *Ammophila arenaria* is considered to be ***favourable*.** The favourable reference range is defined by the current range of the habitat.
- It is estimated that the 44% of the Area of the mobile dunes has assessed as unfavourable in a ten-year reporting period (1996-2006), with 38% inadequate and 6% bad. Consequently, this attribute is assessed as ***unfavourable-bad***. This figure is misleading and does not portray the habitat dynamic, nor the fact that accretion was noted at a number of sites including Bull Island, Cahore Point North, Kilmuckridge, Fermoyle (sub-site) and Dooey.
- Of a total of 482 monitoring stops that were taken, 81 stops failed. 25% and 14% respectively of the habitat area were rated as *unfavourable-inadequate* and *unfavourable-bad* in terms of structure and functions, which is largely due to the health of the vegetation. Therefore, the habitat Structure and Functions have been assessed as ***unfavourable-bad***.
- The Future Prospects are assessed as ***unfavourable-bad***. Natural erosion coupled with recreational pressures are the main threats that result in this rating.

The overall conservation status for Shifting dunes along the shoreline with *Ammophila arenaria* in Ireland is ***unfavourable-bad*** (Table 3.1).

3.2.5 Fixed coastal dunes with herbaceous vegetation (2130)

Covering an estimated area of 7060.58ha, fixed dunes were recorded from 152 sites, which were widely distributed around the coast. The assessment of the main attributes, in terms of the total area assessed, is shown in Figure 3.5.

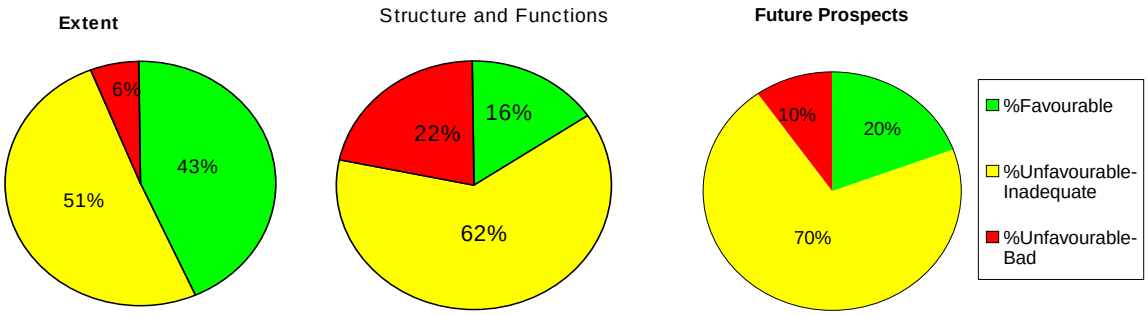

Figure 3.5 Conservation assessment of the Fixed coastal dunes with herbaceous vegetation (2130) in Ireland (Percentage Area)

- The Natural Range of the fixed dunes is considered to be ***favourable***. The favourable reference range is defined by the current range of the habitat.
- The Area of the fixed dunes that is estimated to have been lost is 232.6ha or 3.2% in a ten-year reporting period (1996-2006). This attribute is assessed as ***unfavourable-inadequate***.
- The habitat Structure and Functions have been assessed as ***unfavourable-bad***. 204 out of 923 monitoring stops failed to meet the target (i.e. 22%). The main reasons are a lack of typical species and the presence of negative indicator species, which are indicative of the agricultural and amenity pressures that this habitat is subject to. In terms of habitat area, 62% and 22% respectively of the total area is rated as *unfavourable-inadequate* and *unfavourable-bad* for structure and functions.
- The Future Prospects are assessed as ***unfavourable-bad***. The ongoing threats of agricultural management, recreational pressures and the land development are major concerns for the future.

The overall conservation status for fixed dunes in Ireland is ***unfavourable-bad*** (Table 3.1).

3.2.6 Decalcified fixed dunes with *Empetrum nigrum* (2140)
3.2.7

In Ireland, 5 SAC's have been designated for this habitat. Its presence was confirmed at 3 sites and 1 new site. The two areas (which between them include several sites) where it was not recorded are Tranarossan and Melmore Lough and Lough Nagreany Dunes cSAC. Although *Empetrum nigrum* (Crowberry) has been recorded at these sites, the vegetation in which it is found does not fall into this habitat category. The assessment of the main attributes, in terms of the total area assessed, is shown in Figure 3.6.

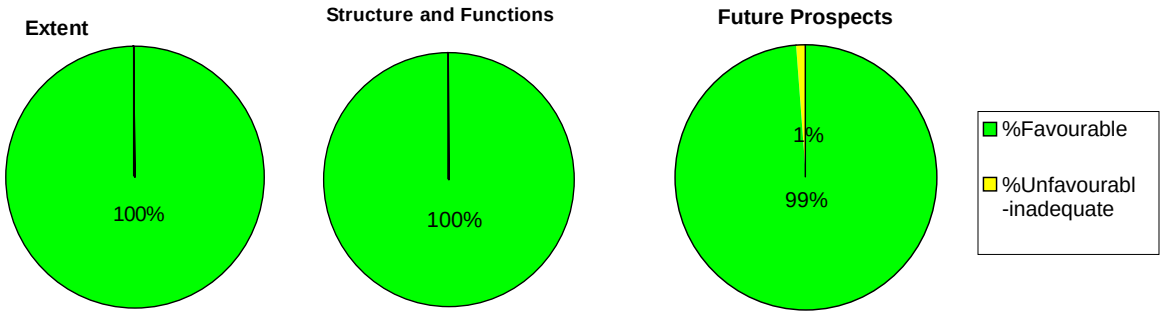

Figure 3.6 Conservation assessment of the Decalcified fixed dunes with *Empetrum nigrum* (2140) in Ireland (Percentage Area)

- The Natural Range of Decalcified fixed dunes with *Empetrum nigrum* is considered to be ***favourable***. The favourable reference range is defined by the current range of the habitat.
- It is estimated that there has been no loss of Area of the decalcified fixed dunes with *Empetrum nigrum* in the ten-year reporting period (1996-2006). This attribute is assessed as ***favourable***.
- 3 monitoring stops were carried out, all of which passed. However, stringent criteria have not been developed for this habitat owing to its paucity and the difficulty in delineating the habitat. In the absence of these criteria, the habitat Structure and Functions has therefore provisionally been assessed as ***favourable***.
- The Future Prospects are assessed as ***unfavourable-inadequate***, which was due to the encroachment of bracken at a small site at Crummies Bay.

The overall conservation status for Decalcified fixed dunes with *Empetrum nigrum* in Ireland is ***unfavourable-inadequate*** (Table 3.1).

3.2.8 Atlantic decalcified fixed dunes (2150)

The habitat was confirmed at 7 of the 11 sites for which it has been designated. Brittas bay on the East coast and the remainder in Mayo and Donegal. Its presence at Magherabeg, Kilpatrick, Ballyteige Burrow and Inchydoney could not be confirmed, based on floristic criteria. The assessment of the main attributes, in terms of the total area assessed, is shown in Figure 3.7.

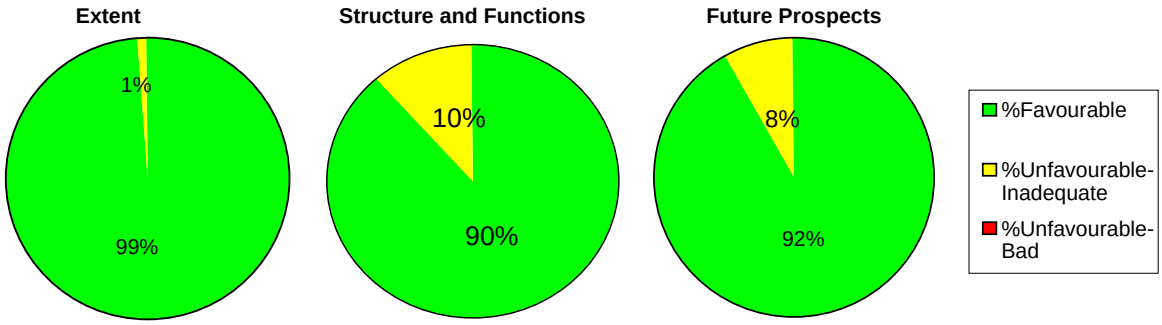

Figure 3.7 Conservation assessment of the Atlantic decalcified fixed dunes (2150) in Ireland (Percentage Area)

- The Natural Range of Atlantic decalcified fixed dunes is considered to be ***favourable***. The favourable reference range is defined by the current range of the habitat.
- Notwithstanding the difficulties that were encountered when identifying the habitat, it is estimated that there has little loss of dune heath has by 0.05% in a ten-year reporting period (1996-2006), which occurred at Brittas Bay. This attribute is assessed as ***unfavourable-inadequate***.
- The habitat Structure and Functions have been provisionally assessed as ***unfavourable-inadequate***. 18 out of 19 monitoring stops passed the target criteria. However, many of the sites, although occurring on sand, did not contain the typical species and best scientific judgement was used. In terms of the confirmed habitat, 10% of the total area was assessed to have failed this attribute.
- The Future Prospects are assessed as ***unfavourable-inadequate*** due to the ongoing pressures from recreational activities.

The overall conservation status for Atlantic decalcified fixed dunes in Ireland is provisionally rated as ***unfavourable-inadequate*** (Table 3.1).

3.2.8 Dunes with *Salix repens* ssp. *argentea* (Salicion arenariea) (2170)

Recorded from a total of 17 sites, the reference area of habitat that is assessed is 118.13ha. The assessment of the main attributes, in terms of the total area assessed, is shown in Figure 3.8.

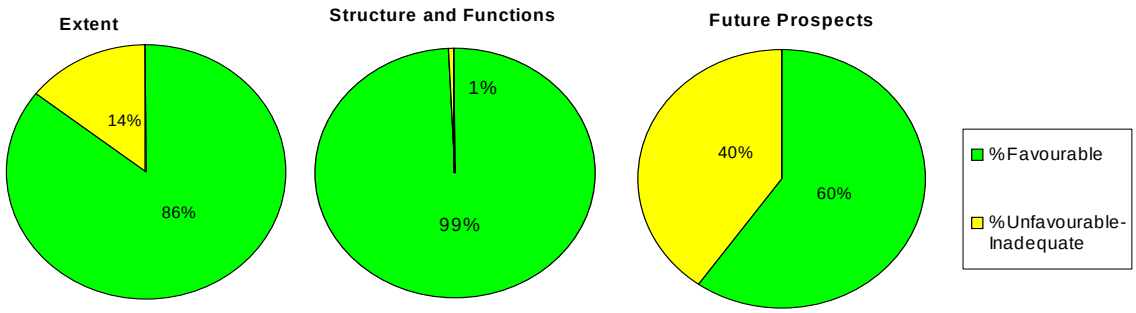

Figure 3.8 Conservation assessment of the Dunes with *Salix repens* ssp. *argentea* (2170) in Ireland (Percentage Area)

- The Natural Range of Dunes with *Salix repens* is considered to be ***favourable***. The favourable reference range is defined by the current range of the habitat.
- The Area of Dunes with *Salix repens* has decreased by 0.3% or 0.459ha in a ten-year reporting period (1996-2006). This attribute is assessed as ***unfavourable-inadequate.***
- The habitat Structure and Functions have been assessed as ***unfavourable-inadequate***. All 34 monitoring stops that were made passed the target criteria, suggesting a *favourable* rating for structure and functions. Small patches of the habitat, however, were noted at a number of sites, resulting in 1% of the total habitat area being rated as *unfavourable-inadequate*. This result is due to undergrazing and indicates that low grazing levels were impacting on the habitat structure and functions.
- Although >25% of the area is unfavourable, based on expert judgement the Future Prospects are only assessed as ***unfavourable-inadequate***, largely due to the continued threat of both undergrazing and overgrazing at different sites.

The overall conservation status for Dunes with *Salix repens* ssp. *argentea* in Ireland is ***unfavourable-inadequate*** (Table 3.1).

3.2.9 Humid dune slacks (2190)

Humid dune slacks were recorded from 64 sites or 211.5ha. The assessment of the main attributes, in terms of the total area assessed, is shown in Figure 3.9.

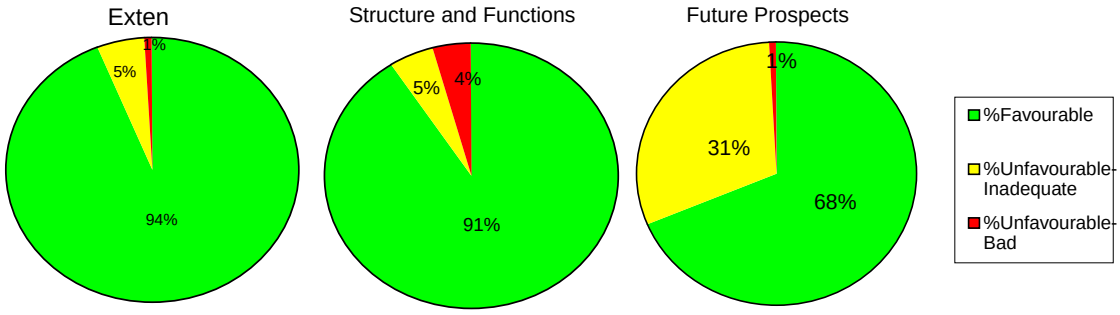

Figure 3.9 Conservation assessment of the Humid dune slacks (2190) in Ireland (Percentage Area)

- The Natural Range of Humid dune slacks is considered to be ***favourable***. The favourable reference range is defined by the current range of the habitat.
- It is estimated that the Area of dune slacks that has been lost is relatively small (0.5ha), which corresponds to a 0.23% loss over a 10-year period (1996-2006). This attribute is assessed as ***unfavourable-inadequate***.
- The habitat Structure and Functions have been assessed as ***unfavourable-inadequate***. Although 10 monitoring stops (5%) out of 196 failed to meet the target, a number of other sites were also assessed on structure and functions on best scientific judgement alone. In terms of the total area, only 91% of the slack area is rated as *favourable* for the structure and functions attribute. The main forbs:grass ratio and the cover of negative indicator species which is indicative of intensive agricultural management.
- The Future Prospects are assessed as ***unfavourable-bad*** as only 68% of slack area is considered *favourable*. The major threat to the slack habitat is the uncontrolled abstraction of groundwater leading to a lowering of the water table, while agricultural management including grazing levels and supplemental feeding along with recreational pressures are also important.

The overall conservation status for humid dune slacks in Ireland is ***unfavourable-bad*** (Table 3.1).

3.2.10 Machairs (21A0)
3.2.11

Machair was recorded from 59 sites along the West coast – Galway, Mayo, Sligo and Donegal. It is estimated to occupy 2752.6ha. The assessment of the main attributes, in terms of the total area assessed, is shown in Figure 3.10.

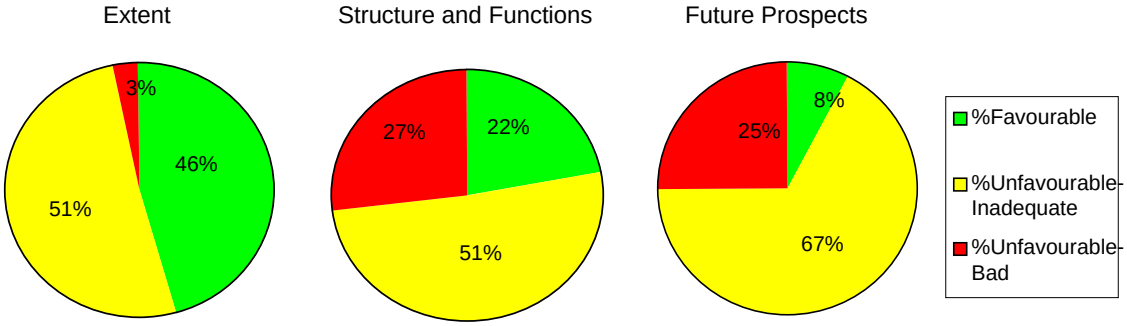

Figure 3.10 Conservation assessment of the Priority Annex I machair (21A0) in Ireland (Percentage Area)

- The Natural Range of machair is considered to be ***favourable***. The favourable reference range is defined by the current range of the habitat.
- The Area of machair has decreased by 66.4ha or 2.35% in the ten-year reporting period (1996-2006). This attribute is assessed as ***unfavourable-inadequate***, primarily due to restructuring of land holdings and agricultural improvement.
- The habitat Structure and Functions have been assessed as ***unfavourable-bad***. 65 monitoring stops out of 369 stops failed to reach the target criteria. Monitoring stops were not made in much of the destroyed machair. In terms of area that was assessed, however, 27% of the total area (14 sites) are considered *unfavourable-bad*. There has been a considerable change in farming, which has seen many machair commonages being strip-fenced often resulting in overgrazed swards, poaching and a spread of negative indicator species.
- The Future Prospects are assessed as ***unfavourable-bad***, as the condition of the habitat is unlikely to change due to the current agricultural practices.

The overall conservation status for machair in Ireland is ***unfavourable-bad*** (Table 3.1).

3.3 MONITORING STOP ATTRIBUTES

Habitat structure and functions were generally assessed by means of monitoring stops in which prescribed targets were set for a series of attributes. The attribute targets are designed to indicate undesirable or negatively impacting pressures within the habitats. For example, the lists of negative indicator species for dune grassland habitats always include *Senecio jacobaea* (Common ragwort) which, when occurring in excessive quantities, is generally symptomatic of overgrazing and *Lolium perenne* (Perennial rye-grass), an excessive cover of which is indicative of agricultural improvement.

The overall pass/fail result of monitoring stops depended on the number of attributes that met the required targets, e.g. in fixed dune monitoring stops, at least four of the five attributes had to reach the desired targets for the stop to achieve an overall pass. The original completed field sheets are contained in the coastal monitoring project site files. The pass/fail result of each attribute in all of the stops is included in the project database in the individual survey site records.

3.3.1 Annex I sand dune habitats

Monitoring stops were generally carried out in multiples of four within each Annex I sand dune habitat at the survey sites, although there were a number of reasons why this was not always the case (Section 2). Occasionally, when the overall monitoring stop result was deemed to misrepresent the true status of the habitat, the structure and functions conservation status assessment was modified to take account of whatever negative habitat characteristics were not adequately revealed in the monitoring stop protocol.

Annual vegetation of driftlines (1210)

The number of monitoring stops in which each annual strandline attribute target either passed or failed, and those numbers as percentages of the total number of annual strandline monitoring stops are shown in Table 3.3

A failure of either attribute to attain the prescribed target results in an overall monitoring stop fail. Both attributes of typical species and negative indicator species passed the prescribed targets at all 97 monitoring stops, indicating a 100% overall pass rate in monitoring stops.

Table 3.3 Numbers of monitoring stops in which each annual strandline attribute target either passed or failed and those numbers as percentages of the total annual strandline monitoring stops

Habitat attribute	Number of passes	Percentage pass rate	Number of fails	Percentage fail rate
Typical species	97	100	0	0
Negative indicator species	97	100	0	0

Total number of monitoring stops is 97

As the CSM guideline for annual strandline typical species - which requires the presence of two species, one at frequent level and the other at least occasional - was modified here to only the presence of a single species, the attribute was in effect, little more than the confirmation of the presence of the habitat.

However, in Ireland mono-specific stands are common in annual strandline (as is also the case in foredune habitats), so employing a typical species target of only a single species would appear to be justified. Over time, data on the long-term trends in the

extent and species composition of strandline habitats will be available, at which point it may be appropriate to tailor the attribute targets to each sand dune site, e.g. at a site where annual strandline habitat has been consistently characterised by two or more species, a typical species target such as 'two species present' may be appropriate, whereas the current target of the presence of a single species may be appropriate for those sites at which mono-specific stands are the norm. Alternatively, long-term data may indicate that there are frequently no reliable trends in vegetation composition at particular sites, making the current target appropriate for all sites.

Negative indicator species are extremely uncommon in strandline habitats, as in general, only highly specialised plants that have evolved strategies to grow in such inhospitable environments are able to colonise. Disturbance to the habitat, in the form of dumping of dredged material or other impacts that introduce negative indicator species to the habitat, could lead to failed monitoring stops, but none were noted here.

Despite the 100% pass rate of annual strandline monitoring stops, there were three sites at which structure and functions were assessed as *unfavourable-inadequate*. In each of these cases, monitoring stops were not carried out and the assessments were based on the site report author's judgement. One of the reasons given for the negative judgements was damage to the vegetation from livestock grazing (Eararna – site 091).

Perennial vegetation of stony banks (1220)

The number of monitoring stops in which each perennial shingle attribute target either passed or failed, and those numbers as percentages of the total number of perennial shingle monitoring stops are shown in Table 3.4.

Table 3.4 Numbers of monitoring stops in which each perennial shingle attribute target either passed or failed and those numbers as percentages of the total perennial shingle monitoring stops

Habitat attribute	Number of passes	Percentage pass rate	Number of fails	Percentage fail rate
Typical species	73	100	0	0
Negative indicator species	72	98.6	1	1.4

Total number of monitoring stops is 73

Of the 73 monitoring stops carried out in *Perennial vegetation of stony banks* 72 (98.6%) passed and 1 (1.4%) failed the overall target criteria. Only one monitoring stop, carried out at Derrymore Island (site 076), failed the overall target criteria. The fail was due to an excessive cover of negative indicator species – represented in this case by *Senecio jacobaea* (Common ragwort). The failed monitoring stop was one of four carried out in the habitat at Derrymore Island, indicating *unfavourable-inadequate* structure and functions for the habitat. All monitoring stops passed the typical species attribute target.

Although only a single monitoring stop failed the overall target criteria, the structure and functions assessments of a number of other sites – mostly small and of generally limited conservation value, e.g. Mountcharles (site 143) and Inver (site 144) - were assessed as either *unfavourable-inadequate* or *unfavourable-bad*, based on the judgement of the site report author.

The 'presence of man-made structures' was included on the Perennial shingle fieldcard and is also in the 'shingle attributes' table in the project database. Although the attribute is not included in the structure and functions assessments of the habitat,

the importance of recording any artificial obstructions to the natural movement of shingle requires the constant observation and recording of any such features. The presence of these structures where they are likely to interfere with the natural mobility of the substrate will generally lead to a negative judgement on the future prospects of the habitat.

Embryonic shifting dunes (2110)

The number of times each embryonic dune attribute target either passed or failed in monitoring stops, and those numbers expressed as a percentage of the total embryonic dune monitoring stops are shown in Table 3.5. Of the 254 monitoring stops carried out in embryonic dunes, 245 (96.5%) passed and 9 (3.5%) failed the overall target criteria. All three attribute targets must be met for a monitoring stop to attain an overall pass.

Table 3.5 Numbers of monitoring stops in which each embryonic dune attribute target either passed or failed and those numbers as percentages of the total embryonic dune monitoring stops

Habitat attribute	Number of passes	Percentage pass rate	Number of fails	Percentage fail rate
Typical species	253	99.6	1	0.4
Negative indicator species	251	98.8	3	1.2
Flowering & Fruiting	248	97.6	6	2.4

Total number of monitoring stops is 254

The most frequently failed attribute was flowering and fruiting, which failed in 6, or 2.4%, of the monitoring stops. The attribute target comprises not only the requirement for flowering and fruiting of the target species, but also the presence of no more than 5% cover of unhealthy plant material. The inherent variability or unpredictability of flowering through the course of a growing season requires the inclusion of the plant health aspect of the attribute target.

The negative indicator species attribute failed in only three monitoring stops. The low number of fails can be largely attributed to the severity of conditions for plant survival and growth. Negative indicator species tend to appear only in embryonic dunes that are quite disturbed by either agricultural or recreational activities.

A single monitoring stop failed the typical species target, which may indicate a certain difficulty in assessing the attribute within the confines of the current monitoring protocol. Vegetation cover in embryonic dunes is generally discontinuous and frequently somewhat sparse, even in the more dynamic and vigorous sites. Positioning monitoring stops in bare areas would result in failed typical species targets, and lead to unfavourable structure and functions assessments. An overall analysis of the typical species cover in the habitat should perhaps be incorporated into the assessment to take account of this issue. Bare sand should be assessed at a site level.

Only one monitoring stop (at Fahan – site 174) failed on two attributes – those of negative indicator species and flowering & fruiting. The nine failed monitoring stops were spread over seven survey sites, while an additional 12 sites were also considered, based on the judgement of the report authors, to have either *unfavourable-inadequate* or *unfavourable-bad* structure and functions. Monitoring stops were not carried out at six of those sites, while the positive monitoring stop results of the other six, which should indicate *favourable* structure and functions, were modified to an

unfavourable assessment, to take account of negative elements not highlighted by the monitoring stops.

Shifting dunes along the shoreline with Ammophila arenaria (white dunes) (2120)

The number of monitoring stops in which each mobile dune attribute target passed or failed, and those numbers as percentages of the total number of mobile dune monitoring stops are shown in Table 3.6. All three attribute targets must be achieved for a mobile dune monitoring stop to attain an overall pass. Of the 482 monitoring stops carried out in mobile dunes, 401 (83.2%) passed and 81 (16.8%) failed the overall target criteria.

Table 3.6 Numbers of monitoring stops in which each mobile dune attribute target either passed or failed and those numbers as percentages of the total mobile dune monitoring stops

Habitat attribute	Number of passes	Percentage pass rate	Number of fails	Percentage fail rate
Typical species	464	96.3	18	3.7
Negative indicator species	469	97.3	13	2.7
Flowering & Fruiting	417	86.5	65	13.5

Total number of monitoring stops is 482

The most frequently failed attribute was flowering and fruiting/plant health, which failed in 65, or 13.5%, of the monitoring stops. In a majority of cases this was due to an excess of dead or unhealthy plant material within the stop. As is the case of embryonic dunes, a lack of flowering or fruiting in the typical species (in this case *Ammophila arenaria* (Marram) and *Leymus arenarius* (Lyme–grass) was usually not in itself considered to indicate poor plant health or a lack of mobility in the system, as the intensity of flowering can fluctuate significantly from year to year, or over the course of a single growing season. Taken together, poor condition and lack of flowering in typical species are usually indicative of sediment starvation and loss of mobility in the dunes.

The other attributes of typical species and negative indicator species had only 18 and 13 fails respectively. Many of the negative indicator species 'fails' were due to the presence of species such as *Senecio jacobaea* (Common ragwort), which was usually a symptom of disturbance in the habitat, caused either by recreational pressures or livestock grazing. Other species such as *Cirsium arvense* (Creeping thistle) tend to indicate enrichment, which was also usually due to livestock rearing management.

Negative indicator species were very uncommon in both strandline and embryonic dune habitats (Tables 3.3 & 3.5, respectively), due in large part to the harshness of conditions for plant growth and the necessity for specific survival adaptations. Only in mobile dunes, do species other than those that typically characterise the dune habitats, begin to appear with regularity, reflecting the less severe conditions experienced as one moves further from the seaward edge of the dunes.

There was an occasional instance of *Hippophae rhamnoides* (Sea buckthorn) in mobile dunes on the east coast, particularly at sites where the species had invaded large areas of the dune grassland, and also a small number of sites where invasive stands of *Pteridium aquilinum* (Bracken) had spread to the mobile dune zone, although at most sites at which these species were present, they were confined to the more stable dune grassland habitats.

The relatively low number of fails in the typical species attribute, in which the target specifies a certain minimum cover of typical species, may be partly due to a certain amount of subjectivity in the positioning of monitoring stops. Mobile dune plant communities, like those of embryonic dunes (see above) can be inherently very dynamic in their distribution, and substantial areas of bare ground may not be symptomatic of poor condition or a general lack of mobility in the zone. In such cases it is advisable to position the monitoring stops in the more substantially vegetated areas, rather than produce monitoring stop 'fails' in habitat which is clearly dynamic and in good condition. At the same time, a sparse cover of typical species may sometimes be a reliable indicator of poor condition (particularly where excessive trampling or other such activities have occurred) – a fact borne out by the regularity with which stops that failed the typical species target, also failed on at least one other attribute target. Of the 18 monitoring stops that included a failed typical species target, 11 failed one or both of the other two attribute targets.

Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)

The number of times each habitat attribute target passed and failed in fixed dune monitoring stops and those numbers expressed as a percentage of the total fixed dune monitoring stops are shown in Table 3.7. At least four of the five attributes must reach the prescribed targets in order for fixed dune monitoring stops to be deemed an overall pass. Of the 923 monitoring stops carried out in the habitat, 720 (78.0%) passed and 203 (22.0%) failed the overall target criteria.

Table 3.7 Numbers of monitoring stops in which each fixed dune attribute target passed or failed and those numbers as percentages of the total fixed dune monitoring stops

Habitat attribute	Number of passes	Percentage pass rate	Number of fails	Percentage fail rate
Typical species	780	84.5	143	15.5
Negative indicator species	766	83	157	17.0
Flowering & Fruiting	880	95.3	43	4.7
Bare ground	890	96.4	33	3.6
Sward height	557	60.3	366	39.6

Total number of monitoring stops is 923

The attribute with the greatest number of fails was sward height, with 366, or 39.6%, of all fixed dune monitoring stops failing the prescribed target of 'species-rich short turf between 5-20cm'. The sward height target in fixed dunes may fail due to either an excessively long sward, which generally indicates undergrazing, or an excessively short sward, which may result from overgrazing. In fixed dunes, undergrazing was the more widespread and common of the two phenomena, and the majority of the 366 instances of failed sward height were attributable to the sward height exceeding the maximum limit incorporated into the attribute target.

The 366 sward height fails were distributed through 111 sites, indicating that many sites had several monitoring stops in which the attribute failed. Almost all of the sites which had a high number of monitoring stops with failed sward height were undergrazed, or lacking in any alternative management which maintained large areas of species-rich short turf. The only site (of those at which five or more monitoring stops failed the attribute target) where all instances of failed sward height were due to overgrazing, and therefore an excessively short sward height was Garter Hill (site

128). Some of the stops at Castlegregory (site 075) that failed the attribute were due to the presence of some overgrazed areas, although more of the failed stops there were due to the presence of undergrazed, rank areas.

There was also a disproportionately high number of east coast sites among the list of those with the greatest number of monitoring stops with failed sward height, due to the general absence of grazing along the east coast. North Bull (site 010), Curracloe (site 034) and Carnsore (site 039) all had eight monitoring stops with failed sward height, while Brittas Bay (site 017) and Tacumshin (site 040) both had seven, which in all cases was due to the presence of long, ungrazed areas in the dune grassland.

The greater frequency with which undergrazing rather than overgrazing was a factor in fixed dunes is also reflected in the assessment of the impacts noted at the survey sites (Section 3.4). Undergrazing was recorded as an impact at 58 fixed dune sites, with a total affected area estimated as 1087ha, while the cumulative total of 63 overgrazing impacts applied to only 47 different sites, as there were a significant number of sites at which either two or three separate overgrazing impacts were noted. The number of sites, and therefore the total area, affected by undergrazing may also be considered as an underestimate, as it was generally not considered as an impact at some sites (particularly on the east coast) where there was no current, or recent, grazing management.

The second most common attribute to fail in fixed dune monitoring stops was negative indicator species, with 157 (17.0%) of all stops failing the set target. The target requires that the listed species - encompassing agricultural grasses, nitrophilous weeds, scrub species, and non-native species, including *Hippophae rhamnoides* (Sea buckthorn) – should singly or together not exceed 5% of cover within each monitoring stop. Monitoring stops that failed this attribute were more common in sites at which agricultural management formed a significant element of the land use. Among the typical reasons for an excessive cover of negative indicator species were the re-seeding of swards with agricultural grasses, fertiliser application, the proliferation of nitrophilous species resulting from high densities of grazing livestock and the presence of livestock feeding and watering stations. On the other hand, undergrazing often resulted in the spread of negative indicator species such as *Hippophae rhamnoides* (Sea buckthorn) or *Pteridium aquilinum* (Bracken). The former was particularly common on the east coast, while invasive stands of the latter species were widespread and regularly seen.

The typical species target, requiring the presence of six typical species, failed in 143 (15.5%) of all fixed dune monitoring stops. The target was modified from the CSM fixed dune protocol of eight typical species present at more than occasional level. Of the 143 monitoring stops that failed the typical species target, 119 also failed the sward height target (Table 3.8), indicating an apparent strong correlation between the two attributes. In cases where they failed to meet the desired targets, both of these attributes usually indicated a rank, or undergrazed sward, dominated by grass species.

The number of monitoring stops in which both attributes failed would be considerably greater still (typical species failed in 32.5% of stops in which sward height failed) had the CSM typical species target for calcareous fixed dunes of ‘at least eight species present at more than occasional level’ been retained for the current survey. The

modification to six species present, without any qualifying cover/abundance stipulation, ensured that many monitoring stops which would have missed the CSM target, had a sufficient number of typical species to pass the revised target.

Table 3.8 Matrix showing the number of times two attribute targets both failed in fixed dune monitoring stops

	Typical species (143)	Negative indicator species (157)	Flowering & fruiting (43)	Bare ground (33)	Sward height (366)
Typical species (143)		**36**	**12**	**6**	**119**
Negative indicator species (157)			**19**	**6**	**61**
Flowering & fruiting (43)				**1**	**24**
Bare ground (33)					**13**
Sward height (366)					

The number of times each attribute failed in monitoring stops are in parentheses

Other significant impacts such as agricultural improvement, may, when attributable to impacts such as the re-seeding of swards, lead to a significant number of failed typical species and negative indicator species attributes in the same monitoring stops, while overgrazing may simultaneously be manifested in failed flowering and fruiting and excessively short sward height. However, as the strongest correlation between failed attributes was that of sward height and typical species, it would appear that the single impact of undergrazing may lead to more overall failed monitoring stops than any other single impact.

In order to reduce the apparent overemphasis on undergrazing, a possible change to the monitoring stop regime could be considered. The very high number of stops with failed sward height suggests that a modification of this target – leading to a lower number of fails for the attribute - may be the appropriate way to reduce the apparent excessive importance that is currently conferred on undergrazing. The current difficulty may lie in the fact that sward height is not an attribute particularly suited to examining within each monitoring stop. Although the average sward height over an entire dune grassland may fall comfortably within the desired range, which in the case of the CSM protocol is 5-25cm, there may be substantial stands of sward that exceed this range, which could result in numerous fails for the attribute.

This is particularly relevant, as a certain amount of long sward in fixed dunes should not necessarily be thought of as a negative feature. Where an adequate proportion of species-rich short turf exists, some longer sward should be considered as part of the natural structural diversity of vegetation at a site. A scenario where the entire sward is grazed to a uniformly short length is unrealistic and need not be considered as a desirable target.

Flowering and fruiting is included among the fixed dune attributes, primarily as a means to expose overgrazing within the grassland. In overgrazed fixed dunes, flowering and fruiting of the typical species may be insufficient to ensure the

colonisation of bare ground with new plants, while flowers and seeds are also an important resource for invertebrates and birds.

The use of the attribute is slightly unsatisfactory in that there may be a considerable degree of variability in flowering levels over the course of a growing season, indicating that the time of survey may have a significant bearing on the level of flowering and fruiting observed. Ideally, field surveys should take place only during the optimum flowering period. Failing this, it may be appropriate to reduce the attribute target or allow a certain amount of subjectivity in assessing the attribute, particularly in cases where overgrazing is not an obvious factor over a significant area of the site.

Over half of the stops, which failed flowering and fruiting, also failed sward height (Table 3.8). When the two attributes both failed in monitoring stops, sward height was often below the minimum target threshold, although there were instances of stops in which the smothering affects of rank, overgrown grass-dominated swards appeared to retard flowering and fruiting of herb species.

Bare ground was the attribute with the lowest total number of fails in fixed dunes, with only 35 (3.8%) fails in 923 monitoring stops (Table 3.7). However, as is the case with sward height, the attribute may not be ideally suited to assessing within the current monitoring stop protocol. Large areas of bare ground, such as blowouts, were frequently mapped separately and thereby distinguished from surrounding intact habitat. Such areas were inevitably bypassed when the locations of monitoring stops were chosen, due to the futility of placing monitoring stops in an unvegetated area where all of the attributes will obviously fail their prescribed targets.

In many sites, this may not be important, as the development and subsequent re-vegetation of bare surfaces are part of the normal functioning of a sand dune system, and a certain amount of bare ground is considered essential for invertebrates. However, unsustainable management regimes (usually relating to intensive livestock rearing) at some sites can lead to excessively large areas of bare ground, which must be considered when assessing the entire habitat. The assessment of bare ground would probably be better suited to a visual assessment (aided, where possible, by an examination of sufficiently recent aerial photographs) of the entire dune grassland.

Nevertheless, any underestimation (using the monitoring stops protocol) of the extent of bare ground at a site, will generally be compensated for by a negative evaluation of one or both of the other conservation status assessment parameters of habitat extent and future prospects, e.g. if trampling and overgrazing by livestock has resulted in large bare areas, future prospects will probably be assessed as *unfavourable* due to the existence of a management regime that is not conducive to the aims of habitat conservation. There also exists the option to downgrade the structure and functions conservation status assessment derived from monitoring stops, if it is felt that the stops did not adequately represent the extent of one or more negative elements of habitat condition.

Excessive bare ground in dune grassland may result from a number of different recreational or agricultural activities. Brittas Bay (site 017) had the greatest number (5) of fixed dune monitoring stops in which the bare ground attribute failed: these can

be largely attributed to the intense recreational pressures to which the habitats are subjected at that site. Other sites at which more than a single monitoring stop had a failed bare ground attribute included Dooaghtry (site 108) and Ballyness (site 161), at both of which the affects of severe overgrazing by livestock are exacerbated by the grazing and burrowing activities of large rabbit populations.

Decalcified fixed dunes with Empetrum nigrum (2140) & Atlantic decalcified fixed dunes (Calluno-Ulicetea) (2150)

Nineteen monitoring stops were carried out in Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) (2150) and three in Decalcified fixed dunes with *Empetrum nigrum* (2140), both of which are priority Annex I habitats.

The monitoring stops in Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) were carried out at Brittas Bay (site 017), Aghleam (site 124), Maghera (site 147), Sheskinmore (site 148), Lough Nagreany (site 169) and Gortnatraw (site 171). Those in Decalcified fixed dunes with *Empetrum nigrum* were carried out at Sheskinmore (site 148) and Keadew (site 153).

The monitoring stops for both habitats were initially based on the CSM protocol for lowland dry heath, which is designed to embrace several dry heath habitats, including Atlantic decalcified fixed dunes (*Calluno-Ulicetea*). Decalcified fixed dunes with *Empetrum nigrum* are not specifically included in the list of heath habitats that are encompassed by the CSM lowland dry heath protocol. In the present survey, the two relevant heath habitats were distinguished solely by the presence of *Empetrum nigrum* (Crowberry) as a significant element of the flora.

Because dune heath habitats are particularly rare in Ireland and due to the lack of sufficient previous data on which appropriate modifications to the protocol could be based, fieldwork proceeded with a largely unmodified version of the CSM lowland dry heath protocol. Furthermore, as all previously known dune heath sites that are characterised by the presence of ericoid dwarf shrubs, are, with the exception of Brittas Bay (site 017) in Wickow, found in the Northwest of the country, which was included in the final survey phase of the project, there was insufficient data on which to finalise the monitoring protocol before the completion of the site survey element of the project.

In addition there are several Irish sand dune sites at which dune heath is reputed to be present, despite the absence of any of the dwarf shrubs, such as *Calluna vulgaris* (Heather) and *Erica* (Heather) spp., which are generally regarded as characterising the habitats. As an assessment of the presence and abundance of these shrubs forms a central element of the habitat attributes in the proposed monitoring protocol, the monitoring regime had to be regarded as redundant for the purposes of assessing these particular sites.

Further difficulties arose with the recognition of the habitat at a number of sites where the presence of siliceous rocks (frequently outcropping) seemed to be at least as important as the presence of sand substrate in influencing the composition of plant communities. In several cases, whereas monitoring stops carried out closely adjacent to the outcropping rock contained a sufficient diversity of species to pass the overall

criteria, those carried out at even a very short distance from the rock formations were likely to lack any significant cover of dwarf shrubs.

Outstanding issues regarding dune heath habitats in Ireland, such as the full delimitation of the habitat characteristics, including an appraisal of all the potential sites where the characteristic dwarf shrubs are absent and those at which the heath communities are apparently confined to outcropping siliceous rocks, may be resolved with a dedicated survey of Irish dune heaths.

In the interim, and for the purposes of assessing dune heath structure and functions, any habitat at which a number of typical species were present and where there was a general lack of damage from negative pressures such as overgrazing, was regarded as being in *favourable* condition. The potential sites at which the potential heath habitat lacked a typical dwarf shrub element were not dealt with comprehensively, and the heaths were generally not independently assessed for conservation status. The issues regarding dune heath habitats are also discussed in Chapter 4.

Dunes with Salix repens ssp. argentea (Salicion arenariea) (2170)

The number of times each Dunes with *Salix repens* attribute target either passed or failed in monitoring stops, and those numbers expressed as percentages of the total number of Dunes with *Salix repens* monitoring stops are shown in Table 3.9.

Table 3.9 Number of monitoring stops in which each Dunes with *Salix repens* attribute target either passed or failed and those numbers as percentages of the total Dunes with *Salix repens* monitoring stops

Habitat attribute	Number of passes	Percentage pass rate	Number of fails	Percentage fail rate
Typical species	32	94.1	2	5.9
Negative indicator species	31	91.2	3	8.8
Cover of broad-leaved grasses	33	97.1	1	2.9
Condition of Salix repens	34	100	0	0
Bare ground	34	100	0	0
Scrub or tree cover	34	100	0	0

Total number of monitoring stops is 34

At least four of the six individual attribute targets had to be reached for a monitoring stop to attain an overall pass. All monitoring stops reached this target and only a single stop (at Maghera – site 147) would have failed (due to a combination of failed typical species and negative indicator species attributes) had the overall target required at least five attributes within a monitoring stop to pass. Nevertheless, there was no other habitat in which more than a single monitoring stop attribute could fail, without the stop being considered an overall fail, so it would be advisable in future, to revise the overall requirement to at least five passed attributes in each stop.

Only typical species, negative indicator species and cover of broad-leaved grasses failed in any of the stops. Most the fails were attributable to agricultural management of the sites, although an excessive cover of broad-leaved grasses is often symptomatic of an ungrazed tussocky sward.

The 'Condition of *Salix repens*' refers to both cover/abundance – must have cover of at least 10% in each stop - and height, which must be in the range of 5-30cm. The attribute target is somewhat unusual in that a failure to meet the target could suggest

that the habitat may be more appropriately considered as dune slack. The abundance and height of the shrub are among the few characteristics currently used to define *Salix repens* dunes and there is a considerable degree of overlap with the characteristics of dune slacks.

As is the case with dune slacks, Scrub or tree cover in *Salix repens* dunes is usually only a factor when there is an existing cover of scrub/tree species at the site. The colonisation of *Salix repens* dunes is likely only when there is insufficient grazing to control the spread.

Humid dune slacks (2190)

The number of monitoring stops in which each dune slack attribute target either passed or failed, and those numbers as percentages of the total number of dune slack monitoring stops are shown in Table 3.10.

Table 3.10 Numbers of monitoring stops in which each dune slack attribute target either passed or failed and those numbers as percentages of the total dune slack monitoring stops

Habitat attribute	Number of passes	Percentage pass rate	Number of fails	Percentage fail rate
Typical species	186	94.9	10	5.1
Negative indicator species	187	95.4	9	4.6
Bare ground	192	98.0	4	2.0
Ratio forbs:grasses	181	92.3	15	7.6
Cover S. repens	185	94.4	11	5.6
Scrub/tree cover	195	99.5	1	0.5

Total number of monitoring stops is 196

Of the 196 monitoring stops carried out in dune slacks, 186 (94.9%) passed and 10 (5.1%) failed the overall criteria, which requires at least five of the six individual habitat attributes to reach their prescribed targets.

The most common failed attribute in dune slacks was forbs/grass ratio. A failure to meet the target of >30% forbs cover and <70% grass cover (unchanged from that advised in the CSM protocol) usually indicates eutrophication and/or drying of the slack. Dune slacks typically exist as discrete areas within dune grassland and may suffer the same adverse affects from intensive agricultural management or recreational pressures that are experienced by the other habitats. Nutrient input from artificial fertilisation is a common impact in more intensively farmed dune systems.

Slacks can also be the location of choice for livestock feeding or watering stations due to the natural shelter sometimes provided by the typical slack topography wherein tall dunes may surround low, flat ground. The affects of concentrating livestock into confined areas include the excessive input of nutrients into the soil from feed waste and dung, which in turn leads to the spread of nitrophilous weeds and coarse grasses. Supplementary feeding stations also have negative consequences for the typical species, negative indicator species and bare ground attributes.

Of the 15 monitoring stops in which forbs/grass ratio failed the prescribed target, three also failed the typical species target and three failed the negative indicator species target (Table 3.11), including one monitoring stop that failed all three attributes.

Table 3.11 Matrix showing the number of times two attribute targets both failed in dune slack monitoring stops

	Typical species (10)	Negative indicator species (9)	Bare ground (4)	Ratio forbs/grasses (15)	Cover of S. repens (11)	Scrub/tree cover (1)
Typical species (10)		**3**	**1**	**3**	**0**	**0**
Negative indicator species (9)			**0**	**3**	**1**	**0**
Bare ground (4)				**1**	**1**	**0**
Ratio forbs/grasses (15)					**1**	**0**
Cover of S. repens (11)						**0**
Scrub/tree cover (1)						
The number of times each attribute failed in monitoring stops are in parentheses						

Some correlation between the attributes is to be expected as the same negative factor may be expressed in two or more of the attributes, e.g. a high cover of *Lolium perenne* (Perennial rye-grass) resulting from agricultural improvement may be sufficient to produce a negative indicator species fail, and at the same time contribute sufficiently to the percentage cover of grasses to produce a forbs/grass ratio fail. In general, an excessive cover of negative indicator species can, depending on the particular species present, indicate poor condition, overgrazing or agricultural improvement.

Activities that can lead to the drying of slacks include water extraction for golf courses or other sports facilities, which, when carried out on a significant scale, can affect the water table level. The impact was rarely noted at the survey sites, although it can probably be numbered among those that were under-recorded, due to the difficulties in recognising it in the absence of direct evidence. Ideally the monitoring of dune slack vegetation should be carried out in conjunction with hydrological monitoring. Information on water levels and water quality should improve the interpretation of the vegetation data collected and draw attention to activities impacting on water table levels.

The scrub/tree cover target was missed in only a single monitoring stop (at Fermoyle – site 074). Where there is an existing presence of scrub in a dune system, an insufficient grazing intensity can result in an excessive spread of the species in dune slacks. Four failed sward height attributes in six fixed dune monitoring stops confirms the impact of undergrazing at Fermoyle.

Creeping willow, *Salix repens*, is a regular feature of dune slacks and will occasionally cover a significant portion of the habitat. However, an excessive cover of the species can, as is also the case with an excessive cover of scrub/tree species, indicate insufficient grazing intensity (or lack of scrub control). The attribute target failed on only five occasions.

The very high percentage pass rate of monitoring stops suggests that the criteria used may be less stringent than is desirable for the purposes of identifying dune slacks in

which the habitat condition is less than favourable, particularly as dune slacks generally exist as discrete areas within fixed dunes and are often subject to the same pressures which adversely affect the grassland habitats.

The most significant introduced change in the current dune slack monitoring stop protocol was the amendment of the typical species attribute target, which in the CSM protocol requires at least four species to occur at frequent level, and two or more others to occur at least occasionally. The presence of four species, with no stipulation on cover/abundance was adopted as the typical species target in the present survey (see Chapter 4). Using the CSM target, or even maintaining the requirement for six species without the qualifying cover/abundance conditions, would certainly have led to a significant extra number of failed typical species attributes.

Machairs (21A0)

The number of times each habitat attribute target passed and failed in machair monitoring stops, and those numbers expressed as a percentage of the total machair monitoring stops are shown in Table 3.12. At least five of the six attributes that comprise the machair monitoring stop protocol must reach the desired targets in order for machair monitoring stops to attain an overall pass.

Table 3.12 Numbers of monitoring stops in which each machair attribute target either passed or failed and those numbers as percentages of the total machair monitoring stops

Habitat attribute	Number of passes	Percentage pass rate	Number of fails	Percentage fail rate
Typical species	334	90.5	35	9.5
Bryophytes	341	92.4	28	7.6
Negative indicator species	306	82.9	63	17.1
Bare ground	360	97.6	9	2.4
Flowering & Fruiting	339	91.9	30	8.1
Sward height	315	85.4	54	14.6

Total number of monitoring stops is 369

Of the 369 machair monitoring stops carried out, 304 (82.4%) passed and 65 (17.6%) failed the overall target criteria.

The most common attributes that failed to reach their prescribed targets in machair monitoring stops were negative indicator species and sward height, with 63 and 54 fails, respectively (Table 3.12). The most common causes of failure to meet the negative indicator species target were an excessive cover of agricultural grasses such as *Lolium perenne* (Perennial rye-grass) and/or weed species such as *Senecio jacobaea* (Common ragwort). The presence of agricultural grasses is generally indicative of agricultural improvement, while an excessive cover of nitrophilous weed species is usually a symptom of intensive livestock rearing practices.

The 63 instances of failed negative indicator species were distributed among only 29 survey sites, indicating that the attribute failed in more than one monitoring stop at a number of sites. This was to be expected, as several of the larger machair sites, such as those on the Mullet Peninsula, have undergone a recent widespread intensification of livestock rearing management. Much of the intensification of agricultural activities has its origins in the restructuring of open commonages into small individually owned strips which has created an incentive for more intensive management. Among the

common practices that occur there and elsewhere and which are manifested in failed negative indicator species targets are the re-seeding of formerly species-rich swards with agricultural grasses such as *Lolium perenne* (Perennial rye-grass), fertiliser application, the maintenance of high stocking densities and therefore overgrazing, and supplementary feeding of stock.

Among the sites with the highest number of monitoring stops that included failed negative indicator species targets were Kinrovar (site 118) and Termoncarragh Lough (site 127), both of which had 5 monitoring stops in which the attribute failed, and Srah North (site 122), where the attribute target was missed in four monitoring stops. All of these sites have *agricultural improvement* (impact code 103) and *stock feeding* (impact code 171) listed as impacts of high intensity, while *fertilisation* (impact code 120) is included as an impact of high intensity at both Termoncarragh Lough and Kinrovar.

A failure to reach the typical species target in monitoring stops can frequently reflect the same impacts that are manifested in failed negative indicator species. A total of 35 monitoring stops, distributed through 19 survey sites, failed the typical species target. The site with the greatest number of fails for the attribute was Kinrovar (site 118), where each of the four monitoring stops that failed the attribute also had a significant negative indicator species cover, represented by *Lolium perenne* (Perennial rye-grass) and either *Cirsium vulgare* (Spear thistle) or *Senecio jacobaea* (Common ragwort).

The 54 sward height fails were spread among only 24 different survey sites, indicating that this attribute target also failed in more than one monitoring stop at a number of sites. In contrast to fixed dunes, most of the sward height fails in machair were due to an excessively short turf caused by overgrazing, a fact reflected in the prominence of three separate overgrazing impacts – those of *overgrazing by sheep* (142), *overgrazing by cattle* (143) and *overgrazing by hares, rabbits, small mammals* (146) - in the list of common machair impacts (Section 3.4/Table 3.22). Undergrazing was only noted at 13 sites, over a total area of 90.8ha. The sites at which the attribute failed the greatest number of times (with the number of monitoring stops in which it failed in parentheses) were Dooaghtry, site 108 (9), Omey Island, site 104 (6), Garter Hill, site 128 (4), Doagh Isle, site 178 (3) and Doolan, site 098 (3). All of these sites were overgrazed by sheep and had particularly large rabbit populations: both had *overgrazing by sheep* (impact code 142) and *overgrazing by hares, rabbits, small mammals* (impact code 146) listed as impacts of high (A) intensity. Of the five sites, *overgrazing by cattle* (impact code 143) was only listed among the impacts recorded at Omey Island. This suggests that the combination of intense sheep and rabbit grazing is particularly detrimental in leading to severely overgrazed machair swards, although there exists the possibility that higher stocking densities at these sites may be the primary cause of damage, rather than the inherent undesirability of combined sheep and rabbit grazing.

Of the 54 machair monitoring stops that included sward height among the failed attributes, 19 also failed the flowering and fruiting target (of a total of 30 monitoring stops that failed flowering and fruiting) (Table 3.13). The strong correlation between the two attributes is to be expected, as reduced flowering and seed production in typical species is also an indicator of overgrazing. In addition to the adverse affects on flowering and seed production, high stocking rates and overgrazing can also cause

poaching and surface break up, which may then be exacerbated by the burrowing activities of rabbits, leading to further destabilisation.

The greater frequency with which the flowering and fruiting attribute target failed in machair monitoring stops compared to fixed dune monitoring stops (Tables 3.8 & 3.12) illustrates the regional variation in land usage, whereby livestock grazing forms a more or less constant element of land use on the west coast (where all machair sites are found). Fixed dunes, on the other hand, are distributed throughout the entire coast, including areas where grazing is not among the dominant land uses.

As is the case in fixed dunes, bare ground was also the attribute with the least number of fails in machair monitoring stops. As mentioned above, the attribute may not be ideally suited to the monitoring stop protocol adopted here, due to a tendency to map some of the larger bare areas and exclude them when choosing stop locations. However, these bare areas can be assessed in the light of the impacts that lead to their formation, and if necessary, the structure and functions assessment can be modified to highlight any adverse condition not revealed by the monitoring stops method of assessment.

The requirement for bryophytes to have at least 10% cover in monitoring stops was not attained in 28 (7.6%) of machair monitoring stops. This attribute was most strongly correlated with negative indicator species, which failed in 14 of the 28 stops in which bryophyte cover failed. Many of the monitoring stops with failed bryophyte cover attributes were in sites with a high degree of agricultural improvement, in which species diversity is often severely compromised by impacts such as fertilisation and the re-seeding of swards with coarse agricultural grasses. Five of the 28 monitoring stops in which the bryophyte attribute failed were in Kinrovar (site 118), one of the machair sites most severely damaged by agricultural improvement.

Table 3.13 Matrix showing the number of times two attribute targets both failed in machair monitoring stops

	Typical species	Bryophytes	Negative indicator species	Bare ground	Flowering & fruiting	Sward height
Typical species (35)		**8**	**17**	**2**	**7**	**11**
Bryophytes (28)			**14**	**3**	**3**	**4**
Negative indicator species (63)				**0**	**7**	**11**
Bare ground (9)					**3**	**5**
Flowering & fruiting (30)						**19**
Sward height (54)						

The number of times each attribute failed in monitoring stops are in parentheses

3.4 IMPACTS AND ACTIVITIES

The full lists of activities known to be affecting all Annex I sand dune habitats at each of the 181 sites on the updated inventory of Irish sand dune sites, are included in the individual site reports in Volume II of this report and in the coastal monitoring project database. An assessment of the observed or perceived impacts at each site, including an evaluation of the intensity of each impact and the positive or negative influence of the impacts was included in each site report. The estimated area of each habitat affected by the recorded impacts was also included in each report.

The intensity of the influence of each activity was rated as either A (= high), B (= medium) or C (= low). The positive or negative affect of the influence was indicated by the ratings: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence.

The areas affected by each recorded activity at all of the sites are usually based on simple visual estimates. Occasionally, GPS mapping points may form the basis of some or all of the estimate of the area affected, e.g. when large stands of invasive species – usually included under *invasion by a species* (code 954) - are mapped using the GPS area function, the area of that stand (automatically generated in the GIS data processing procedure), may form part or all of the estimated affected area for the impact.

The areas of habitats affected by impacts were sometimes recorded as 'unknown' and are therefore not included in the total affected areas, e.g. when there are no previous data with which to assess recent loss of habitat through erosion, or when the extent of habitats affected by certain impacts is inherently uncertain, as is often the case with sand extraction in foredune or strandline habitats. The areas affected by impacts that were not directly observed, but listed due to their inclusion in site management plans (or other reliable sources) were also usually considered as unknown.

Most recorded activities and their impacts refer to those observed during site visits, while additional data obtained from sources such as site management plans and site inspection reports (SIRS) produced by NPWS local conservation staff, are also included. The distinction between observed impacts and those derived from other sources is generally made in the site report text.

3.4.1 Annex I sand dune habitats

All impacts at the survey sites were assessed for each Annex I sand dune habitat in which they were observed, or were otherwise known to occur. Impacts that were known to occur but could not be reliably ascribed to a particular habitat or habitats were sometimes referred to 'entire dune habitat' (for which the code 21BB was introduced).

Annual vegetation of driftlines (1210)

The four impacts recorded at more than a single site in *Annual vegetation of driftlines* are shown in Table 3.14. Eight other impacts were also recorded in the habitat, making a total of 12, none of which were considered, in any instance, to represent an irreparable negative influence in the habitat.

Table 3.14 Most frequently recorded impacts in annual vegetation of driftlines; number of sites from which the impacts were recorded and total area affected by each impact

Code	Impact/Activity	Number of sites	Total area affected (ha)
622	Walking, horseriding and non-motorised vehicles	21	5.0
900	Erosion	19	1.6
720	Trampling, overuse	6	2.6
871	Sea defence or coastal protection works	3	0.6

Total number of sites at which the habitat was present = 71
Total habitat area = 52.2ha

In common with several other habitats, *walking, horseriding and non-motorised vehicles* (622) and *erosion* (900) were the most common impacts recorded in the habitat (Table 3.14). Although horseriding is not an uncommon activity on beaches and sand dunes, most of the records of *walking, horseriding and non-motorised vehicles* were attributable to the use of beaches for walking and similar activities. All records of the impact were thought to represent a repairable negative influence, while the intensities were mostly assessed as either medium (B) or low (C). Disturbance from these activities can damage plant material, interfere with flowering and fruiting and disrupt the process whereby sand begins to accumulate and initiate dune formation.

All instances of *erosion* (900) were deemed to exert a neutral influence on the habitat (as the impact refers to a natural occurrence), while the estimated total affected area of 1.6ha is based on only six individual area estimates. The affected areas of the other 13 records of the impact were recorded as 'unknown'.

The only other impacts noted in the habitat at more than a single site were *Trampling, overuse* (720) and *sea defence or coastal protection works* (871), which were listed for six and three sites respectively. Despite the apparent stabilisation of habitat that can result, coastal protection works disrupt the natural mobility of sediment in sand dune systems, and are generally regarded as exerting a negative impact.

A certain amount of under-recording of impacts in the habitat may be assumed, as the affects of several potentially damaging actions, such as *sand and gravel extraction* (300) and *removal of beach materials* (302), are unlikely to be detectable, except in the very short term. Anecdotal evidence suggests that these activities take place, if only on a small scale, more regularly than the number of recorded instances indicates. Included among the activities accommodated under *removal of beach materials* (302) is the removal or disruption of the strandline by beach cleaning. Driftline organic material contains a seed source for annual plants and is essential for trapping sand and initiating dune formation. Any removal of material, particularly by mechanical cleaning, can adversely affect the process. The occurrence of the impact may sometimes only be confirmed by consultation with the relevant local authority, although it is not particularly common, and is mostly confined to the beaches most heavily used for recreational purposes.

In the absence of data on recent trends in the occurrence of strandline vegetation at sand dune sites, the affects of erosion and sediment depletion may also be underestimated. The present data and those resulting from future monitoring cycles will provide information on which future long-term trends can be identified. Short-

term fluctuations in occurrence may be less important, due to the inherently ephemeral nature of the habitat.

Perennial vegetation of stony banks (1220)

All seven of the impacts recorded at more than a single site in *Perennial vegetation of stony Banks* are shown in Table 3.15. Six other impacts were noted at only a single site each, making a total of thirteen recorded in the habitat.

Table 3.15 Most frequently recorded impacts in Perennial vegetation of stony banks; number of sites at which the impacts were recorded and the total area affected by each impact

Code	Impact/Activity	Number of sites	Total area affected (ha)
900	Erosion	13	4.2
622	Walking, horseriding and non-motorised vehicles	10	1.7
871	Sea defence or coastal protection works	6	1.4
302	Removal of beach materials	6	4.0
623	Motorised vehicles	4	0.9
720	Trampling, overuse	4	0.1
423	Disposal of inert materials	2	0.1

Total number of sites at which the habitat was present = 47
Total habitat area = 26.61

In common with Annual vegetation of driftlines, the two most commonly noted impacts were *erosion* (900) and *walking, horseriding and non-motorised vehicles* (622), although in this case the order of frequency was reversed, with erosion the most commonly listed impact. Also included in the list of commonly recorded impacts were *sea defence or coastal protection works* (871) and *trampling, overuse* (720), the two other impacts noted at more than a single site in annual vegetation of driftlines.

When access to the beach area is not controlled, shingle zones can, particularly when they are adjacent to access points and because of the relatively stable nature of the substrate, be damaged by the use of motorised vehicles (623). There are even recorded instances, such as that observed at Rossbehy (site 068), of the material in shingle banks being levelled and re-worked for use as car parking areas, leading to the effective destruction of part or all of the habitat.

There were several recorded instances - included under a number of different impacts - in which damage to the habitat was considered to be irreparable. Those under which more than a single example was recorded were *removal of beach materials* (300), which was deemed to represent irreparable damage at four sites and *sea defence or coastal protection works* (871), which was considered as such at two of the survey sites. Most of the areas associated with irreparable damage were either very small, or were considered as 'unknown'. Included under *sea defence or coastal protection works* (871) was the presence of walls or other artificial impediments to the natural mobility of shingle. Their presence should generally be regarded as an irreparable negative influence, as they represent an interruption to the natural movement of shingle. The importance of recording the existence of such structures is illustrated by its inclusion as an attribute (albeit without a target) on the habitat fieldcard employed in the present survey (Appendices 3 & 4). Where present, they should be regarded as a negative factor in the assessment of habitat future prospects.

The total areas affected by each impact included in Table 3.15 are all understated, as at least half of the individual estimated affected areas of each impact (with the exception of *Motorised vehicles* (623)) were recorded as 'unknown'. In some cases, such as that of *erosion* (900), this may be explained by the fact that there are no substantial baseline data on habitat extent, with which apparent recent losses may be compared. Future monitoring surveys and reports will be able to utilise the habitat extent data generated in the present survey to produce more refined estimates of areas affected by impacts and threats, although some difficulties in distinguishing between the areas of damage resulting from human interference and the areas attributable to natural erosion will probably persist.

Embryonic shifting dunes (2110)

The four impacts noted in embryonic dunes at more than three of the survey sites are listed in Table 3.16. An additional 16 impacts were recorded in embryonic dunes at less than four sites, making a total of 20 different impact codes invoked for the habitat.

Table 3.16 Most frequently recorded impacts in Embryonic shifting dunes; number of sites at which the impacts were recorded and the total area affected by each impact

Code	Impact/Activity	Number of sites	Total area affected (ha)
900	Erosion	56	17.4
622	Walking, horseriding and non-motorised vehicles	49	32.9
720	Trampling, overuse	19	11.8
871	Sea defence or coastal protection works	16	5.3

Total number of sites at which the habitat was present = 116
Total habitat area = 171.5ha

The very limited number of commonly occurring impacts probably partly reflects the difficulty in recognising certain activities in the more dynamic zones of dune systems, e.g. the affects of *sand extraction* (300) or *motorised vehicles* (623) may be discernible for only a very short period after the activity has occurred and are therefore probably under-recorded.

As is the case with a number of other habitats, *erosion* (900) and *walking, horseriding and non-motorised vehicles* (622) were the two most commonly recorded impacts in embryonic dunes, and indeed the four impacts in Table 3.16 are those that were noted at more than one survey site in annual vegetation of driftlines (Table 3.14). The total number of sites affected by *erosion* (900) may still be underestimated, as the impact is generally not listed at sites from which the habitat is currently absent, despite the fact that the absence may in fact be due to recent erosion events. The majority of individual site areas were also recorded as 'unknown' and therefore do not form part of the overall area of 17.4ha (Table 3.16). The establishment here of baseline data on the extent of all sand dune habitats will identify those sites at which habitats not present during a particular survey cycle were formerly present and will therefore enable greater refinement of the lists of impacts and activities in future monitoring cycles. However, the fact that foredune and strandline habitats naturally contain a high proportion of bare sand creates difficulties in recognising the impact of activities such as *trampling*, *overuse* (720) or *sand extraction* (300).

Recognising eroding or accreting embryonic dunes can be difficult due to the limited data available on most sand dune sites. There are very few accreting embryonic dunes

throughout the coastline and embryonic dunes are generally less well developed on the west coast than elsewhere. The habitat was mapped at 116 sites – significantly less than the 140 sites at which mobile dunes were present. Where embryonic dune are apparently accumulating, it is often due to the local recycling of sediment, rather than a substantial build-up arising from a fresh input of sediment into the dune systems. Good quality data, based on accurate GPS mapping, on the extent of habitats at all individual significant sand dune systems and consequently the total national extent of habitats will provide significant insights into the long-term fluctuations of habitat areas, although sediment budget studies of coastal cells would be desirable, if the issues were to be more thoroughly resolved.
Only four separate impact records, which were described under *sand and gravel extraction* (300), *removal of beach materials* (302) or *sea defence/coastal protection works* (871), were considered to represent an irreparable negative influence in embryonic dunes. The areas of three of these were considered 'unknown', while the fourth (included under *sea defence/coastal protection works* (871)) was estimated as 0.4ha. However, a certain amount of under-recording, particularly in *sand and gravel extraction* (300) and related impacts, should be considered, as the affects of these activities are likely to be discernible for only a short time after the occurrence.

One of the typical embryonic dune species, *Leymus arenarius* (Lyme–grass), has been introduced at east coast sites for the purposes of dune stabilisation (Curtis, 1991b). Although planting may perhaps have been concentrated in the mobile dune zone, where the species is also part of the typical vegetation, the introduction of the species has represented a source from which further colonies, perhaps comprising embryonic dunes, may have established. Such affects will have gone largely undetected and may point to an underestimation of the affects of this form of dune protection works. Although the different forms of coastal protection works observed were sometimes viewed differently in terms of the influence they imparted, any interference with the natural mobility of a system should, in general, be regarded as undesirable.

Shifting dunes along the shoreline with <u>Ammophila arenaria</u> (white dunes) (2120)
All seven of the impacts that were noted in 'Shifting dunes along the shoreline with *Ammophila arenaria*' (mobile dunes) at more than three of the survey sites are listed in Table 3.17. Fifteen other impacts were noted at either one or two sites, making a total of 22 different impacts recorded in the habitat.

Table 3.17 Most frequently recorded impacts in Mobile dunes; number of sites at which the impacts were recorded and the total area affected by each impact

Code	Impact/Activity	Number of sites	Total area affected (ha)
900	Erosion	86	37.0
622	Walking, horseriding and non-motorised vehicles	62	142.2
720	Trampling, overuse	32	59.7
871	Sea defence or coastal protection works	25	5.4
623	Motorised vehicles	8	10.7
501	Paths, tracks, cycling routes	6	0.1
140	Grazing	6	0.7

Total number of sites at which the habitat was present = 140
Total habitat area = 405.6ha

In common with a number of other habitats, *erosion* (900) and *walking, horseriding and non-motorised vehicles* (622), were the two most commonly noted impacts in

mobile dunes, with records from 86 and 62 sites respectively. The total area affected by *erosion* can, as is the case with other habitats, be considered a considerable underestimate, as the affected areas were considered as 'unknown' in 53 of the sites from which the impact was noted. Similarly, the areas for *sea defence or coastal protection works* (871) were recorded as 'unknown' at 12 of the sites from which the impact was noted. There is apparently also a high degree of subjectivity in assigning an influence rating to this impact, as *irreparable negative influence* (-2), *repairable negative influence* (-1), *neutral* (0) and *strongly managed positive influence* (+2) were all used with varying frequency to describe the impact at different sites. Where hard protection works, such as rock armour, were installed to protect property, with little consideration of the likely long-term affects on sediment dynamics, the impact on dune habitats was more likely to be assigned a negative influence rating. The impact was more likely to be considered as either positive or neutral when the protection works are employed to stabilise a stretch of habitat in imminent danger of severe erosion. However, the artificial stabilisation of sediment, which may produce an apparent benefit in the short term, should not be unthinkingly regarded as a positive impact: in general, any interruption to the natural mobility of a sand dune system should be regarded as having a negative impact.

The inclusion of grazing among the more regularly noted impacts may seem somewhat unusual, as the typical vegetation is not generally grazed, nor are livestock generally free to access the foredune area of sand dune systems. There were however, a number of sites, e.g. Bunduff (site 139), at which livestock had access to the foredunes, where some grazing of *Ammophila arenaria* (Marram) was noted.

Only a very few impacts in mobile dunes were thought to have caused irreparable damage to the habitat. Most of these were described under *Sand and gravel extraction* (300), *Removal of Beach Materials* (302) and *Sea defence/coastal protection works* (871). The affected areas were generally very small or were recorded as 'unknown'.

In addition to the most regularly noted recreation-related impact of *walking, horseriding and non-motorised vehicles* (622), the inclusion in Table 3.17 of a number of other recreation based impacts, such as *Trampling, overuse* (720), *Motorised vehicles* (623) and *Paths, tracks, cycling routes* (501) illustrates the degree to which foredune habitats may be damaged by amenity pressures. This is particularly so along the more developed and densely populated east coast, where most sites are subject to quite intense recreational pressures. Mobile home and caravan parks add to the local amenity pressures and a particular feature of mobile dunes was the frequency with which localised damage around access tracks, and beside the most heavily used parts of beaches, occurred. Although some sites, particularly on the west coast, are less exposed to intense recreational use due to lower population densities, relative isolation, or perhaps more restricted or forbidding access to sites due to agricultural management of the dune system, there are enough popular holiday destinations spread throughout the country to make recreational impacts a reasonably constant factor in sand dunes.

Where accretion of mobile dunes was believed to be occurring, *Other natural processes* (990) may have been invoked to describe the process, although the lack of previous data and consequent uncertainty surrounding the recent trend of habitat extent at the sites may have discouraged its use. Future surveys will be able to utilise

the data generated here as the basis on which more definite conclusions on the accretion or erosion of habitat can be made.

The pioneer species, *Leymus arenarius* (Lyme–grass), has been introduced for dune stabilisation at a number of east coast sites (Curtis, 1991b). All of the planted colonies and further colonies that have spread from planted areas in particular, are unlikely to have been recognised during the course of the present survey. This suggests that the total extent of these dune stabilisation or protection works may heave been underestimated.

Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)

The 30 impacts that were noted in fixed dunes at more than three of the survey sites are listed in Table 3.18. An additional 35 impacts were noted at three or less of the sites, making a total of 65 separate impacts recorded in the habitat.

Of the ten Annex I sand dune habitats surveyed here, fixed dunes have the greatest number of impacts that occur at a significant number of sites. This may be attributed not only to fact that the habitat occupies by far the largest area (approximately 7060ha) of all sand dune habitats, but because fixed dunes, by their nature, represent a resource for a range of agricultural and amenity uses that most of the other habitats, such as strandline and foredune habitats, clearly do not.

The most commonly noted impact in fixed dunes was *walking, horseriding and non-motorised vehicles* (622), which was listed at 85 (or 55 of the survey sites). The almost ubiquitous use of sand dunes for recreational activities makes even this figure seem surprisingly low, although the same activities may frequently have been accommodated under *Trampling, overuse* (720), which was noted at 51 (or 33 of the sites). The affect of the impacts varied considerably, with high intensities common on east coast sites where recreational pressures are generally greater. A number of west coast sites were less intensely impacted by recreational use due to lower population densities and/or agricultural management of the sites. Walking can, when not at an overly intense level, occasionally exert a positive influence in dune grassland. Where grazing livestock are absent, and sward is generally of a rank nature, one of the affects of walking may be the creation of some short-turf areas, where plant species diversity often exceeds that of much of the site. However, the impact of walking and associated activities is generally negative and is often sufficiently intense to include soil compaction, surface break-up, or the creation of permanent tracks on which the vegetation cover has been severely eroded, in the list of negative consequences.

Erosion (900) was included among the recorded impacts in fixed dunes at 71 sites, although this may represent an underestimation of the actual total due to the lack of very accurate previous data or sufficiently distinct aerial photographs. Although the 2000 series and 1995 series aerial photographs used in this survey provided useful indications of erosion in sand dunes, it was often not possible to reliably distinguish the individual habitats present. However, during site visits, erosion was generally quite obvious at sites where foredune habitats were absent and fixed dunes formed the seaward boundary of the sand dunes. The slumping of fixed dune vegetation on the front faces of dunes often confirmed the ongoing influence of erosion in the habitat.

Table 3.18 Most frequently recorded impacts in Fixed dunes; number of sites at which the impacts were recorded and the total area affected by each impact

Code	Impact/Activity	Number of sites	Total area affected (ha)
622	Walking, horseriding and non-motorised vehicles	85	1080.8
900	Erosion	71	408.6
140	Grazing	58	1861.0
149	Undergrazing	58	1087.8
954	Invasion by a species	56	275.3
720	Trampling, overuse	51	494.6
608	Camping and caravans	49	132.6
103	Agricultural improvement	32	506.4
171	Stock feeding	35	115.3
143	Overgrazing by cattle	32	725.8
623	Motorised vehicles	29	117.6
501	Paths, tracks, cycling routes	28	24.9
601	Golf course	26	1132.4
146	Overgrazing by hares, rabbits, small mammals	24	512.6
150	Restructuring agricultural land holding	22	845.4
871	Sea defence or coastal protection works	21	12.4
403	Dispersed habitation	19	12.4
421	Disposal of household waste	18	5.3
300	Sand and gravel extraction	17	5.3
790	Other pollution or human activities	15	16.0
607	Sports pitch	13	16.6
490	Other urbanisation, industrial and similar activities	10	3.6
180	Burning	8	0.4
402	Discontinuous urbanisation	7	4.8
502	Routes, autoroutes	8	6.1
120	Fertilisation	7	250
142	Overgrazing by sheep	7	422
400	Urbanised areas, human habitation	6	8.4
700	Pollution	5	1.2
971	Competition	5	111.5

Total number of sites at which the habitat was present = 152
Total habitat area = 7060.6ha

The total area affected by *erosion* (900) is also greatly underestimated as the majority of individual site area records are entered as 'unknown'. This again, is largely due to the lack of accurate previous records with which the current data can be compared. Where specific areas are attributed to the impact, they are usually based on the judgement of the site report authors, rather than on changes from previous extent measurements. The current survey will provide the necessary data for more meaningful estimates of habitat loss in future reporting cycles.

Invasion by a species (code 954) was noted in fixed dunes at 56 sites. On the east coast, *Hippophae rhamnoides* (Sea buckthorn) was a common invasive species, often spreading from golf courses or the hedging around private houses and mobile homes. The species is much less common on the south and west coasts, with extensive stands found only at Castlegregory (site 075) and Rinclevan (site 162). In the former case, *H. rhamnoides* has been extensively planted as a means of stabilising the eroding dunes. A number of small east coast sandhill sites have, in the absence of grazing or management regimes that include scrub clearance among their aims, been greatly affected by the spread of *H. rhamnoides*. At sites such as Kilgorman (024), much of

the natural dune area is mapped as scrub and is excluded from the total sand dune area, due to the dense growth form of the shrub over a wide area.

The most commonly occurring and widespread invasive species in fixed dunes was *Pteridium aquilinum* (Bracken), which is included among the list of negative indicator species on the fixed dune monitoring fieldcard. The most commonly occurring and widespread invasive scrub species were *Prunus spinosa* (Blackthorn) and *Rubus fruticosus* (Bramble).

A significant presence of invasive species was often directly related to undergrazing: of the 56 sites at which *invasion by a species* was noted, 24 were among those at which *undergrazing* (code 149) was recorded. The correlation would be even greater were it not for the fact that undergrazing was generally not considered as an impact at east coast sites, while many of the undergrazing records refer to only small, relatively insignificant areas of sites, which are otherwise quite substantially grazed and therefore tend not to have invasive stands of scrub or other species

There can be a degree of overlap in the recording of *Pteridium aquilinum* (Bracken) insofar as it is included as a negative indicator species in the fixed dune monitoring protocol and may therefore contribute to an *unfavourable-inadequate* or *unfavourable-bad* assessment of structure and functions; while if present in significant quantities, may also be recorded as *invasion by a species* (code 954) and therefore contribute to a negative future prospects assessment. However, large stands of scrub or invasive species such as Bracken were generally avoided when choosing the locations of monitoring stops, when it is clear that they are substantial enough to be factored into the assessment of future prospects.

Substantial stands of invasive species were sometimes mapped as scrub, and therefore excluded from the total fixed dune (or other relevant habitat) area. However, there was no consistent minimum area threshold, beyond which these species were always mapped separately and excluded from the sand dune total areas. In the future, a consistent approach to dealing with the issue should be implemented. It may be preferable to retain all or almost all such stands within the areas of sand dune habitat to which they naturally belong (most frequently fixed dunes) and account for the compromised conservation status of the habitat by a negative structure and functions and/or future prospects assessment. The difficulties were illustrated at the Raven (site 035) for which this report followed previous reports and habitat maps in excluding the large conifer plantation from consideration as sand dune habitat, due to the greatly modified conditions which now exist there. It seems, however, that the removal of significant numbers of trees - which is currently proposed for the management of the site (NPWS, unpublished report) - could see a quite rapid rehabilitation of sand dune vegetation, which would lead to a future increase in the area mapped as sand dune.

Grazing (140) and *undergrazing* (149) were both noted in fixed dunes in 58 of the survey sites, although the former refers to the positive affect of grazing livestock in creating and maintaining the short turf that is crucial for species diversity, while the latter is generally always regarded as a repairable negative influence, leading to rank, grass-dominated swards and a reduction in species diversity.

Undergrazing was noted in 58 (38%) sites, with a total affected area estimated at 1097.8ha, or 15.9% of the national fixed dune area. Each recorded instance of the impact was considered as a repairable negative influence, although the intensity of the impact influence was mostly rated as either medium or high. The affects of undergrazing were often manifested in fixed dune monitoring stops, where sward height was, by some margin, the most commonly failed habitat attribute (Table 3.7).

Undergrazing (code 149) can be considered as somewhat under-recorded as it could legitimately be listed at any site where the dune grassland is of a rank, or overgrown nature, but has generally been omitted from any site where there is no current, or recent grazing management. Thus, the only east coast sites where undergrazing has been included among the lists of activities are Magherabeg (site 016) and Kilpatrick (site 023), where agricultural use forms a significant part of the land management. At most other east coast sites where the dune grassland is of an overgrown or rank nature, land use is dominated by amenity activities and developments, and grazing is not a realistic option for site management.

The cumulative total number of overgrazing impacts recorded in fixed dunes was 63, consisting of *overgrazing by cattle* (32 sites), *overgrazing by hares, rabbits, small mammals* (24 sites) and *overgrazing by sheep* (7 sites). This only slightly exceeds the number of sites at which undergrazing was noted (58), although the fact that there were several sites where two overgrazing impacts were noted and two sites - Garter Hill (site 128) and Coney Island (site 134) – where three overgrazing impacts were listed, meant that only 47 different survey sites were affected by overgrazing.

The marked regional variation in land management can be seen in the almost total absence of all grazing impacts from east coast sites, and the frequency with which several impacts under the general grazing category form a major element in south coast and west coast sites in particular. A very small proportion of east coast sites have a current management regime, or recent history, of livestock grazing and only six east coast survey sites were associated with any of the grazing activities. Development pressures and intense recreational use are almost always more significant factors in east coast sand dune systems.

There were 25 different impacts in fixed dunes under which some of the individual records were thought to represent an irreparable negative influence. The more commonly recorded of these impacts included *sand and gravel extraction* (300), some of those listed under the general category of *urbanised areas, human habitation* (400), *sports pitch* (607), *golf course* (601), *camping and caravans* (608), *agricultural structures* (430), as well as a number listed under the heading of *transportation & communication* that refer to roads and paths etc. The areas concerned were often quite small, although occasionally, very large areas, particularly in the case of golf clubs, were affected. The total negative affect and the area of natural dune habitat occupied by golf clubs was somewhat understated, as the impact code was generally only invoked in cases where the course was developed after 1996 - the chosen baseline date with which the current data was compared when estimating changes in habitat extent.

Although it is feasible that some of the developments or sports facilities deemed to represent irreparable damage could be restored to functioning sand dune habitat, the

extreme unlikelihood of this happening in most cases, suggests that the most negative outlook on the impact influence is appropriate, e.g. although some golf courses retain elements of conservation interest and could be readily restored to habitat managed for conservation purposes, the unlikelihood of their being abandoned as golf clubs renders the loss to the conservation value of the dune system all but permanent.

The situation with golf courses illustrates the importance of interpreting impacts in the context of frequency of occurrence, intensity of impact *and* area affected, e.g. although *golf course* (code 601) was only the thirteenth most commonly noted impact in fixed dunes, it was usually regarded as being of high intensity and had the second largest total affected area (after *grazing* (code 140)), although it had a lower proportion of 'unknown' areas than a small number of other impacts that affected large areas. Among the larger individual areas affected by golf course developments were those at Termoncarragh Lough (site 127) and Rosapenna (site 166), where the affected areas exceeded 100ha and 200ha respectively.

Some other frequently noted impacts, such as *stock feeding* (171) which was the ninth most common impact in fixed dunes, had only a small total affected area, due to the fact that the damage typically associated with the impact is usually concentrated around ring feeders and water troughs.

Decalcified fixed dunes with* Empetrum nigrum *(2140) & Atlantic decalcified fixed dunes (Calluno-Ulicetea) (2150)

Such were the very limited areas of Dune Heath (H2140 & H2150) mapped that the full lists of impacts for the habitats are extremely short, with only *grazing* (code 140) observed at more than a single site for either habitat (Table 3.19). Most of the recorded impacts relate to livestock rearing practices, reflecting the dominant land use within the geographical range in which most of the relevant sites are found. A single impact was noted for the four sites in which Decalcified fixed dunes with *Empetrum nigrum* was found, while seven separate impacts were listed for the seven sites at which Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) was mapped.

Table 3.19 All impacts recorded in Dune Heath habitats (2140 & 2150); number of sites at which the impacts were recorded and the total area affected by each impact

Code	Impact/Activity	Number of sites	Total area affected
Decalcified fixed dunes with *Empetrum nigrum* (2140)			
140	Grazing	1	0.3
Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) (2150)			
103	Agricultural improvement	1	0.3
140	Grazing	3	24.0
143	Overgrazing by cattle	1	6.0
150	Restructuring agricultural land holding	1	0.3
171	Stock feeding	1	0.3
301	Quarries	1	20.0
971	Interspecific floral relations	1	0.2

Total number of sites at which the habitat (2140) was present = 4; Total habitat area = 2.8ha
Total number of sites at which the habitat (2150) was present = 7; Total habitat area = 77.8ha

All instances of *grazing* (140) in both habitats were regarded as exerting a positive influence, while the only instance of an impact causing irreparable damage to a dune heath habitat is that of *Quarries* (301) at Askintinny (site 22), which refers to the

expansion of a quarry into an area that may have previously supported dune heath habitat. However, much of the available information on Askintinny suggests that the once extensive heath was not a sand dune habitat, but rather a form of coastal heath. Occasional references to 'sandy heath' in the site files warranted its inclusion as a possible dune heath site.

A review of the entire national resource of known or potential dune heath sites, suggests that several sites – particularly those not characterised by the presence of 'classic' ericoid dwarf shrubs, or others at which the shallowness of sand cover and lack of sand-binding species indicates a non-sand dune habitat – may not in time be regarded as true dune heaths. The lists of impacts relevant to Irish dune heath sites may change as the understanding of the habitats becomes more refined.

Dunes with* Salix repens *ssp.* argentea *(Salicion arenariea) (2170)

The four impacts noted in Dunes with *Salix repens* at more than a single survey site are listed in Table 3.20. A further eight impacts were each noted at a single site. The most commonly occurring impact (*Grazing* – 140) was, in all cases, used to describe either a positive or neutral influence, reflecting the desirability of a sustainable grazing regime that helps to maintain species diversity and check the potential spread of scrub species. *Undergrazing* (149) was also among the more common impacts and was considered as a repairable negative influence in each recorded case. Undergrazing in the habitat can lead to the development of a tussocky sward with a high cover of broad-leaved grasses, and the spread of scrub/tree species when present.

Table 3.20 Most frequently recorded impacts in Dunes with *Salix repens*; number of sites at which the impacts were recorded and the total area affected by each impact

Code	Impact/Activity	Number of sites	Total area affected
140	Grazing	8	39.3
149	Undergrazing	3	11.6
150	Restructuring agricultural land holding	3	33.5
622	Walking, horseriding and non-motorised vehicles	3	1.6

Total number of sites at which the habitat was present = 17
Total habitat area = 118.4ha

The only instance of an impact in Dunes with *Salix repens* being considered as an irreparable negative influence was the single recorded example of *Agricultural structures* (430) at Aghleam (site 124). The same impact was noted on several occasions - usually to describe small permanent animal shelters - in other dune grassland habitats on the Mullet Peninsula, where the recent restructuring of grazing land has had numerous negative consequences for the conservation value of sand dune habitats.

Recreational pressures were proportionately less important in the habitat than at many of the other sand dune habitats, which may be due in part to the isolated location of some of the sites at which the habitat is found, and the fact that several of the sites are used for livestock grazing.

The composition of the list of activities and impacts ascribed to 'Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariea*)' during the project may have been influenced to some degree by issues regarding the precise delimitation of the habitat,

such as those concerning the characteristics that distinguish it from other habitats, most notably 'Humid dune slacks'. One impact/activity that seemed to be particularly influential in bringing about conditions that led to the successional change from wet slack habitat to drier '*Salix repens* dune' habitat was the presence of large conifer plantations on wet or damp dune grassland. The existence of discrete areas of 'Dunes with *Salix repens*' habitat in small clear areas within conifer plantations at The Raven (site 035), Strandhill (site 133) and Mullanasole (site 142), that appear to meet the habitat definition (as outlined in the Interpretation manual of European Union Habitats) more precisely than all other examples of the habitat identified here, suggests that the forestry management regimes are central to the existence of the habitat at the sites. It seems likely that changes in the hydrological functioning of the dune system, brought about by the large scale planting, may have led to the drying of habitat that formerly supported species assemblages more characteristic of wetter dune slack habitat. The impact of forestry management – recorded as an impact under *general forestry management* (code 160) - was only invoked for Mullanasole (site 142), as the precise affects of the site management regimes were difficult to determine. The impact was recorded in fixed dunes at several sites, including the three discussed here, as the affects of conifer plantations in modifying large areas formerly occupied by this habitat were clear.

Humid dune slacks (2190)

All impacts noted in dune slacks at more than three sites are shown in Table 3.21. In addition to the seven impacts included in Table 3.21, a further 14 impacts were noted at less than four sites. The most frequently recorded impact was *grazing* (140) and in all recorded cases, it was used to describe either a positive or neutral influence. As is the case with other dune grassland habitats, an appropriate grazing regime will help to maintain species diversity and control the possible spread of scrub species through the habitat.

The total area affected affected by grazing of 49.5ha may be only a slight underestimate, as only two separate individual areas were recorded as 'unknown'. However, one of these refers to Inch (site 070), which is known to support large dune slack areas and is grazed, but was not assessed by a site visit.

The most commonly recorded impact in dune slacks was *Grazing* (140), all instances of which were rated as either neutral or positive. The less regularly noted grazing impacts with constant negative influences were *overgrazing by sheep* (142) and *undergrazing* (149), which were both noted at four sites.

Only three individual impact records in dune slacks - one each of which were described under *Agricultural improvement* (103), *Sand and gravel extraction* (300) and *Golf course* (601) – were considered to represent irreparable negative influences. The areas affected were small, with the instance of *Golf course* (601) at White Strand (site 081) having – at 2.0ha – by far the largest recorded area of the three.

Table 3.21 Most frequently recorded impacts in Dune slacks; number of sites at which the impacts were recorded and the total area affected by each impact

Code	Impact/Activity	Number of sites	Total area affected
140	Grazing	17	49.5
622	Walking, horseriding and non-motorised vehicles	6	2.9
150	Restructuring agricultural land holding	5	21.5
103	Agricultural improvement	4	1.8
142	Overgrazing by sheep	4	6.3
149	Undergrazing	4	2.7
171	Stock feeding	4	2.2

Total number of sites at which the habitat was present = 64
Total habitat area = 211.5ha

Despite the fact that dune slacks may - due to the natural shelter afforded by the typical slack topography of a hollow surrounded by dune ridges - represent a desirable location for supplementary feeding stations, there were only four separate records of *stock feeding* (171), all of which were from west coast sites. The low number of records may be partly explained by the fact that hollows that topographically suggested dune slack habitat at a number of sites, may have been damaged by stock feeding to the point that the areas were no longer recognisable as dune slacks. In other cases, the occurrence of nitrophilous weed species in dune slacks suggested that supplementary feeding of stock had formerly taken place, but could no longer be confirmed, due to the apparent discontinuation of the practice in those particular areas.

As previous data on the occurrence and distribution of dune slacks in Ireland was found, during the present survey, to be notably incomplete, it was not possible to ascertain in certain cases, if some damaged areas had formerly supported dune slack plant communities. The current survey has resulted in a more thorough mapping of dune slacks, which will facilitate a more precise evaluation of impacts and threats in future monitoring surveys.

As was the case with Dunes with *Salix repens*, the impact of *general forestry management* (code 160) was noted in dune slacks only at Mullanasole (site 142). It may have been appropriate to consider it as an impact at The Raven (site 035) and at Strandhill (site 133) due to the apparent affect of conifer plantations in altering the water table level in dune systems (see above), although the lack of accurate baseline habitat maps prevented confirmation of the former existence of wet slacks in these areas which now support plant communities more characteristic of Salix repens dunes.

Machairs (21A0)

All impacts noted in machair at more than three survey sites are included in Table 3.22. In addition to the 25 impacts included in Table 3.22, a further 25 were noted at three or less sites, making a total of 50 separate impacts for the habitat.

Machair, like fixed dunes, represent a generally stable grassland habitat where agricultural or amenity management may dominate large areas of habitat. Consequently there were a wide range of impacts recorded at a significant number of sites. Like fixed dunes, several common impacts, such as *overgrazing by sheep* (142), *overgrazing by cattle* (143), *stock feeding* (171), and *agricultural structures* (43) were directly attributable to livestock rearing practices, while others such as *camping and*

caravans (608) and *sports pitch* (607), reflect the frequency with which machair is used for recreational purposes. Football fields account for all 11 recorded instances of the *sports pitch* impact (code 607), a disproportionately high number compared to 13 instances of the impact recorded in fixed dunes (Table 3.18). This is due to the fact that machair plains often represent the only suitable level area for playing fields, in landscapes that may be dominated by tall dunes, mountains, bogs, fens and intensively farmed land. Several of the football fields were not intensively managed and retain much of the characteristic machair vegetation. Only three of the pitches were thought to be of High (A) intensity, and of these, only one was deemed – due to the construction of a wall around the field – to represent an irreparable negative influence. Other leisure activities to which extensive, flat machair plains lend themselves include horse or pony racing. There is a long history of pony racing at Aillebrack (site 100), where the continued use of the machair for this purpose is a cause for concern due to poaching and surface break up, and the subsequent ground repair practices that occur.

Table 3.22 Most frequently recorded impacts in Machair; number of sites at which the impacts were recorded and the total area affected by each impact

Code	Impact/Activity	Number of sites	Total area affected
140	Grazing	34	1140.4
900	Erosion	28	160.7
150	Restructuring agricultural land holding	28	676.8
142	Overgrazing by sheep	23	714.7
622	Walking, horseriding and non-motorised vehicles	24	382.1
103	Agricultural improvement	20	424.2
143	Overgrazing by cattle	19	499.4
623	Motorised vehicles	19	101.6
171	Stock feeding	16	66.3
720	Trampling, overuse	15	279.0
149	Undergrazing	13	90.8
608	Camping and caravans	12	40.1
607	Sports pitch	11	17.9
146	Overgrazing by hares, rabbits, small mammals	11	386.1
120	Fertilisation	9	314.9
403	Dispersed habitation	8	14.5
421	Disposal of household waste	8	2.4
954	Invasion by a species	8	28.3
501	Paths, tracks, cycling routes	7	7.4
790	Other pollution or human activities	7	40.0
430	Agricultural structures	5	16.2
300	Sand and gravel extraction	4	6.4
400	Urbanised areas, human habitation	4	1.4
423	Disposal of inert materials	4	2.0
601	Golf course	4	172.8

Total number of sites at which the habitat was present = 59
Total habitat area = 2752.7ha

The frequency with which unenclosed machair plains have been restructured into small, individually owned, fenced strips is reflected in the prominence of *Restructuring agricultural land holding* (150) in the list of impacts (Table 3.22). Of the 28 sites (47.5 % of all machair sites) at which the impact was noted, it was rated as being of high intensity (A) at 16. The impact was most apparent on the Mullet Peninsula in Northwest Mayo, where several large tracts of open machair - some of which were formerly considered to be among the best examples of the habitat in the

country - have been divided up and strip fenced, with serious consequences for their conservation value.

Individual instances of impacts considered to have an irreparable negative influence in machair sites were included under 16 different impact codes. Those with the greatest numbers of sites were *Dispersed habitation* (403) – which generally describes 'one-off' housing - and *Paths, tracks, cycling tracks* (501), under which seven and four records respectively, were deemed to represent an irreparable negative influence. The areas affected by these impacts were generally not large, with the largest individual area of 4.5ha recorded under *Dispersed habitation* (403) and a total affected area of only 14.5ha (plus one 'unknown'). None of those listed in *Paths, tracks, cycling tracks* (501) exceeded 2ha in area. There was only one instance in which *agricultural improvement* (103) was deemed to represent an irreparable negative influence, which, given the frequency with which the impact was noted, and the intensification of agricultural management practices that have radically compromised the conservation value of many machair sites - particularly on the Mullet Peninsula in Northwest Mayo - may seem surprising. However, as almost the entire affected habitat was thought to be restorable to a more favourable condition (regardless of the likelihood of appropriate management plans being implemented) the impact was generally considered as a repairable negative influence. Only at Lettermacaward (site 151) where a large portion of the machair plain has been managed intensively for farming purposes for a long period of time - to the extent that it can scarcely be considered as part of the functioning dune system - was the impact deemed to represent an irreparable negative influence. Other impacts, of which some instances were thought to an represent irreparable negative influence, included *Sand and Gravel extraction* (300), several of those listed in the broad category of *Urbanised areas, human habitation* (400), *Agricultural structures* (430), and a number of 'Leisure and Tourism' impacts such as *Golf course* (601) and *Sports pitch* (607).

Impacts associated with livestock rearing dominate the list of significant impacts in machair, with several grazing impacts (those included under the general category of grazing) and others such as *agricultural improvement* (103) and *restructuring of agricultural holdings* (150) all prominent on the list of significant impacts (Table 3.22). However, the current national stocking levels of both cattle and sheep are predicted to decline in the short-term, due to the recent implementation (in 2005) of the EU Common Agricultural Policy (CAP) reform, under which the link between farm subsidies and production was broken or 'decoupled', thereby removing much of the incentive to over-production. Whether future declines in livestock numbers match the predicted declines and whether any such declines will be experienced at a proportionate rate in sand dune habitats remains to be seen. Several machair sites could benefit from a reduction in sheep numbers, as overgrazing is quite severe in a number of cases. The number of sites at which a reduction in cattle stocking density would improve the conservation value of the habitat is considerably fewer. This includes the large sites on the Mullet Peninsula in Northwest Mayo, formerly renowned for some of the finest examples of machair in the country, but now experiencing an ongoing decline in condition due to the intensification of stock rearing practices.

The general differences in livestock management regimes between fixed dunes, where cattle are the more common grazers, and machair, where sheep grazing is more prevalent can be seen in a comparison of the grazing impacts recorded in the two habitats. In machair, *overgrazing by sheep* (142) was the most commonly recorded of the grazing impacts that describe an adverse affect on the vegetation structure, while the same impact was of relatively minor significance in fixed dunes, being noted at only seven sites (Table 3.18). The most common overgrazing impact in fixed dunes was overgrazing by cattle, which was listed at 32 sites, although this impact was also quite frequently noted in machair. Overgrazing by rabbits, described under *overgrazing by hares, rabbits, small mammals* (code 146) was also relatively common in machair and, particularly when combined with *overgrazing by sheep*, appeared to result in some of the most severely overgrazed and damaged machair swards, such as those at Dooaghtry (site 108) and Garter Hill (site 128), seen during the survey.

As was the case with other habitats, the area of *erosion* (900) in machair is (at 160.7ha) a considerable underestimate, due to the frequency with which the area affected at individual sites was considered 'unknown'. Over 60% of individual site records for the impact were recorded as having 'unknown' areas. The data produced in the present survey can be used to provide more accurate assessments of habitat loss in future surveys.

The contrast between machair land use in Ireland and Scotland can be seen in the rarity with which *cultivation* (code 100) appears on lists of impacts here. Only two machair sites had *cultivation* among the lists of recorded impacts and the total affected area of 1.5ha indicates the small scale on which the activity now takes place. However, the former extensive use of machair for potato production is evidenced by the reasonable frequency with which old cultivation ridges, or 'lazy beds', are seen in the habitat.

'Entire dune habitat' - 21BB

The impacts noted under Code 21BB – used to signify the entire dune habitat - are shown in Table 3.23. Code 21BB was introduced for cases where impacts were known to occur, but the individual habitat or habitats affected could not be determined. The 16 impacts that were assigned to 21BB at more than three survey sites are listed in Table 3.23. An additional 29 impacts were assigned to 21BB at three or less sites, making a total of 45 separate impacts identified for the designation.

A typical scenario in which the 21BB designation was invoked was where there appeared to be strong evidence of a recent impact, such as erosion – perhaps through comparison with recent aerial photographs - but the former occurrence and extent of individual sand dune habitats was uncertain due to the lack of data or precise habitat maps. In such cases it was often more appropriate to estimate the loss of area in the sand dune system as a whole, rather that speculate as to the former areas of individual habitats.

Table 3.23 Most frequently recorded impacts in '21BB' (entire dune habitat); number of sites at which the impacts were recorded and the total area affected by each impact

Code	Impact/Activity	Number of sites	Total area affected
900	Erosion	31	146.4
622	Walking, horseriding and non-motorised vehicles	17	85.2
871	Sea defence or coastal protection works	15	131.7
623	Motorised vehicles	13	128.8
608	Camping and caravans	9	10.2
501	Paths, tracks, cycling routes	8	17.7
601	Golf course	7	84.1
720	Trampling, overuse	7	14.0
302	Removal of Beach Materials	6	1.2
530	Improved access to site	5	4.0
701	Water pollution	5	0.49
790	Other pollution or human impacts/activities	5	0.25
403	Dispersed habitation	4	6.5
621	Nautical sports	4	145.7
870	Dykes, embankments, artificial beaches, General	4	15.6
954	Invasion by a species	4	12.5

Some impacts, such as *removal of beach Materials* (302), *water pollution* (701), *other pollution or human impacts/activities* (790) and *nautical sports* (621) generally refer to impacts that are known to occur, but have no clearly defined impact on a particular dune habitat, e.g. water pollution originating in or adjacent to a sand dune system may have an affect which cannot be quantified or assigned to a particular habitat or habitats.

Some of the impacts included under 21BB, such as *nautical sports* (621) would clearly, not in themselves, represent a direct threat to sand dune habitats, but are included for the purposes of comprehensively describing the activities occurring in, or adjacent to, the habitats. In such cases, the activities would be considered to have a neutral impact. Any direct impact on sand dune habitats caused by related activities, such as the transport of water sports equipment through the dunes, would be accommodated under other impact codes such as *motorised vehicles* (623).

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 UNRESOLVED HABITAT CHARACTERISATIONS

The CSM protocol was chosen as it allowed a platform from which a methodology could be developed for use in Irish sand dune systems that is easily replicated and relatively straightforward in its operation. However, in a number of the Annex I sand dune habitats, in particular – Perennial vegetation of stony banks (1220), Decalcified fixed dunes with *Empetrum nigrum* (2140), Atlantic decalcified fixed dunes (2150), Dunes with *Salix repens* ssp. *argentea* (2170), Humid dune slacks (2190) and Machairs (21A0), there was uncertainty as to whether the CSM monitoring protocol would be appropriate, or what if any modifications to the protocol would be necessary. The application of the CSM methodology was not without problems and several parameters used in evaluating the status of a habitat are dependent on and based upon changes from the previous condition and/or understanding. While there have been a number of studies on individual sand dune systems or indeed an entire habitat (as listed in Chapter 1), the ecological characteristics of some habitats in Ireland remains uncertain. The apparent paucity of some habitats e.g. dune heath and the uncertainty of the ecological functioning of other habitats would require additional information such as soil surveys or hydrological profiling so that realistic targets could be set.

Machairs (21A0)

Machair is a complex sand dune habitat that is confined globally to the northwest coasts of Scotland and Ireland. In Ireland it is found from the Aran Islands, Co. Galway to Malin Head, Co. Donegal (Bassett & Curtis, 1985; Curtis, 1991a).

The highly dynamic nature of machair makes it difficult to classify the vegetation. As sand moves across machair plains, wet areas can become infilled, while new damp patches are exposed continually as the system is eroded down to the water-table. As a consequence, much of the vegetation is transitional between wet and dry communities. In addition, no plant species or communities are unique to machair. The vegetation of machair can typically be described as a mosaic of calcareous fixed dune, mesotrophic grassland and dune slack communities (Gaynor, 2006). Although there is generally an obvious distinction between dry and wet machair, transitional communities are common. In contrast to the CSM protocol, both wet and dry machair were included in the current monitoring regime, and separate typical species lists were devised - on the advice of NPWS staff – for the two forms.

The Interpretation manual of European Union Habitats (April 2003) describes machair as ‘a complex habitat comprised of a sandy coastal plain resulting from grazing and/or rotational cultivation, in an oceanic location with a cool, moist climate’, while the following five criteria were used by Curtis (1991b) to define the habitat:

1. A mature coastal sandy plain, with a more or less level surface
2. A significant proportion of shell fragments in the sand producing a lime-rich soil (pH >7)
3. Grassland vegetation with a low frequency of sand-binding species, and with the core of species listed by Gimingham (1974): *Achillea millefolium* (Yarrow), *Bellis perennis* (Daisy), *Euphrasia* spp. (Eyebright), *Festuca rubra* (Red fescue), *Galium verum* (Lady’s bedstraw), *Lotus corniculatus* (Common bird’s-foot-

trefoil), *Plantago lanceolata* (Ribwort plantain) and *Trifolium repens* (White clover) and the moss *Rhytidiadelphus squarrosus*
4. Human interference, principally by grazing, during the recent historical period.
5. A moist, cool, oceanic climate

These criteria were the ones on which recognition of the habitat was based in the present survey. Previous data and habitat maps, particularly those produced in the Biomar machair survey (Crawford *et al*., 1996), were also used to clarify some of the difficulties involved. However, habitat classification and mapping in that survey were based on the NVC system of classification, and as all of the British NVC communities used to define machair can also apply to other dune habitats, the maps were of limited use in defining the habitat in terms of its Annex I classification.

The most regularly arising difficulty in recognising machair during the survey, was due to the lack of unique plant species or communities that define the habitat, and the consequent subjectivity that arose in assigning habitat at some of the survey sites to either machair or fixed dunes. Of particular significance were the sites at which grazing management had apparently been inconsistent in recent years, with the result that previously tightly grazed swards became more grass-dominated with, in particular, a greater cover of *Ammophila arenaria* (Marram). Each individual site was treated on its own merits and the justification for the decisions made are included in each individual site report.

As machair plains are often terminated on the landward side by marsh or fen, there was also some subjectivity in deciding where the precise landward machair boundaries should be at some sites, particularly as typical machair vegetation resembles a mosaic of a number of wet and dry habitats.

At some small sites there was a suspicion that some level areas may be due to large-scale earth-moving operations, rather than erosion by wind action of a dune system, which is a constant feature of true machair. The absence of continuous historical data on these sites, made it difficult to satisfactorily determine the habitat, although in most cases, the areas in question were at least provisionally mapped as machair.

There are exceptions to the typical machair formation, such as that at Garter Hill in Mayo (site 128), where machair extends for some distance up the seaward face of inland hills, due to the particularly strong winds and suitable wind direction. A similar formation was noted at Lenankeel (site 176) – a site not previously associated with machair – in the present survey, and has provisionally been added to the list of machair sites. A previously disregarded area at the north end of Rinclevan (site 162) has also been added to the list of machair sites.

Future phytosociological or other surveys – perhaps involving the comprehensive establishment of calcium carbonate ($CaCO_3$) values for all known and potential machair sites - may lead to further refinement of the definition of machair in Ireland.

The attributes used in machair monitoring stops were the same as those for fixed dunes, with the exception of an assessment of bryophyte cover, which does not apply in fixed dunes. The typical species lists and targets for some other attributes were different, reflecting the different habitat characteristics and agricultural management

regimes that apply in the two habitats. The overall pass/fail rates of monitoring stops in the two habitats were quite similar, with 82.4% of machair stops passing and 78.0% of fixed dune stops passing. Whether the machair attribute targets were sufficiently stringent in highlighting poor condition in some sites, particularly in light of some of the recent severe declines in machair habitats, is a moot point and may require revision in the future.

Decalcified fixed dunes with* Empetrum nigrum *(2140) & Atlantic decalcified fixed dunes (Calluno-Ulicetea) (2150)

It became clear during fieldwork that, for a number of reasons, the CSM[1] protocol for monitoring the conservation of dune heath habitats – both Decalcified fixed dunes with *Empetrum nigrum* (2140) and Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) (2150) - would not be as readily adapted to Irish dune systems, as those for other sand dune habitats have been. Reasons principally concerned the relative paucity of species found in dune heaths in Ireland, the very restricted national distribution of the habitats, the limited extent of the habitats at individual sites and their typical occurrence within habitat mosaics.

Dune heath habitats are rare in Ireland, and prior to the present survey they were known from only 10 sites in the case of Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), and five in the case of Decalcified fixed dunes with *Empetrum nigrum* (2140), based on information obtained from the NPWS NATURA 2000 database.

Furthermore, at a number of sites where Atlantic decalcified fixed dunes was reported to exist, its presence is marked floristically by little more than a dispersed cover of *Ulex europaeus* (Gorse) scrub. Among these are Ballyteige Burrow (Site 041), where Nooren & Schouten (1976) based their recognition of the habitat on both soil characteristics and floristics.

On the east and south coasts, the only dune system where dune heath habitat may be recognised by the presence of the classic ericoid shrubs, such as *Calluna vulgaris* (Ling heather) and *Erica* spp., is at Brittas Bay (site 017).

The CSM protocol for monitoring Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) (2150) is included in the guidance document for Lowland heathland (JNCC, 2004). Decalcified fixed dunes with *Empetrum nigrum* (2140) are not specifically referred to in the document, but as the two habitats were distinguished in the present survey only by the presence or absence of *Empetrum nigrum* (Crowberry) as a significant element of the habitat flora, the same protocol was initially deemed to be applicable to both habitats.

Most sand dune heath sites are found on the west coast, and even there, there are no more than a handful of sites with a substantial expanse of species-rich habitat. The best examples of the habitats are probably those found at Maghera (site 147) and Sheskinmore, Co. Donegal (site 148).

In addition to the heaths recognised by the presence of only one or two plants, there are a number sites on the west coast where dune heaths have been identified despite the suggestion that their presence may owe more to the underlying (and frequently outcropping) rock type, rather than the process by which calcareous dune grassland

becomes decalcified and colonised by heath species over a long time period. The typical heath dwarf shrubs in these habitats were often confined almost entirely to a small area on, or immediately adjacent to exposed rock, suggesting that the sand cover was largely incidental to the presence of heath plant communities.

However, it was decided for the purposes of this project that dune heath would be recognised in cases where a reasonable depth (at least approximately 4-5cm) of sand existed at the uppermost level of substrate, and/or sand-binding plant species (particularly *Carex arenaria* (Sand sedge)) were present. Nevertheless, it seems clear that these habitats have not formed in the classic dune heath fashion, whereby the leaching of basic minerals and plant nutrients lowers the soil pH over time and creates conditions on the landward side of dunes, suitable for colonisation by heath species. The successional nature of this process is implicit in the Annex I habitat names, in both of which, the term 'decalcified' is incorporated.

As the proposed dune heath field card – adapted from the CSM protocol - proved unsuitable for the purposes of assessing habitat structure and functions, it was decided that in the present report, *favourable* structure and functions would simply reflect the presence of a number of typical species, and an absence of any significant damage, such as that caused by overgrazing or agricultural machinery. The supposed heath habitats at sites that lacked a typical dwarf shrub element - namely Magherabeg (site 016), Kilpatrick (site 023), Ballyteige Burrow (site 041) and Inchydoney (site 058) - were not dealt with comprehensively, and the habitats were not independently assessed for conservation status.

A review of the information on dune heath habitats collected during this survey suggests that a dedicated survey of all known or potential Irish dune heath sites, incorporating data on floristics, soil composition and other relevant characteristic would be desirable and will be necessary for the formulation of the criteria to be used in the future monitoring of these habitats. The priority Annex I status of the two Irish dune heath habitats makes the need for such a survey all the more pressing.

The five sites from which Decalcified fixed dunes with *Empetrum nigrum* was previously known were Keadew (site 153), Maghera (site 147) and Sheskinmore (site 148) at which it was also recorded during the current survey, as well as Melmore (site 168) and Lough Nagreany (site 169), from which its presence was not confirmed during the current survey. The habitat was also formerly known from Termoncarragh Lough (site 127), where its presence formed part of the reason for the proposed cSAC designation of the Mullet/Blacksod Complex, although it appears that the habitat is either no longer present, or *E. nigrum* may be such a minor component of the vegetation as to no longer warrant recognition of the habitat. A small area of the habitat - apparently not previously known - was mapped at Crummie's Bay (site 175) during the site visit for the present report, bringing to four the number of sites from which the habitat was recorded. However, a more thorough examination of the habitat may lead to a re-evaluation of the status of some sites and result in a revision of the total site numbers.

At six of the 10 sites from which Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) was previously known or reported to exist, the habitat is characterised by the presence of dwarf ericoid shrubs, while the other four - Magherabeg (site 016), Kilpatrick (site

023), Ballyteige Burrow (site 041) and Inchydoney (site 058) - are lacking in any such component of the site flora. The presence of the habitat at the other six sites – Brittas Bay (site 017), Aghleam (site 124), Maghera (site 147), Sheskinmore (site 148), Cruit Lower (site 154) and Lough Nagreany (site 169) - was confirmed during the current survey. Termoncarragh Lough (site 127), from which Decalcified fixed dunes with *Empetrum nigrum* was previously known (see above), was found during the present survey to support a small area of Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), bringing to seven the number of sites characterised by the presence of dwarf ericoid shrubs.

Askintinny (site 022) was also considered as a possible dune heath site due to references in the site files to the once extensive 'sandy heath' that existed there. However, most references to the habitat, which has since been largely destroyed by the expansion of quarrying activities, suggest it was not a sand dune habitat, but rather a form of coastal heath, and it need not be included in any future consideration of Irish dune heath habitats.

A monitoring stop at Gortnatraw (site 170) was tentatively assigned to Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), although that habitat was not mapped at the site. The monitoring stop was assigned to that habitat primarily due to the presence of *Erica cinerea* (Heather), although there were few other species present that are closely associated with the habitat. The monitoring stop may be representative of a small pocket of heath-type habitat that is more closely associated with the adjacent rocky hills than the sand dune system. It is retained here, however, as any future comprehensive investigation of Irish dune heath habitats should include a visit to the site, so that the potential existence of dune heath should be thoroughly investigated. This is particularly so, as the adjacent Lough Nagreany (site 169) has been identified as a site for both of the dune heath habitats under discussion.

The presence of *Juniperus communis* (Common juniper) in a number of heath communities was also interesting in that some such habitat, including some from Sheskinmore (site 148), has previously been referred to the Annex I habitat '*Juniperus communis* formations on heaths or calcareous grassland' (5130). This habitat was not recognised in the current survey, however, and *J. communis* was, when found in sand dunes, regarded either as a component of dune heath or fixed dune grassland. Its presence in heath communities may be due, as is apparently the case with some of the other shrub species found, to the presence of outcropping rock with which it is often more closely associated. Current research work on issues regarding *Juniperus communis* should lead to a better understanding of the status of the species in heath and grassland plant communities.

Humid dune slacks (2190)/ Dunes with* Salix repens *ssp.* argentea *(Salicion arenariea)(2170)

There were a number of difficulties in identifying *Dunes with Salix repens* habitat, the most significant of which was in the degree to which the habitat characteristics overlapped with those of humid dune slacks. Under the British NVC system, SD16 - the only community that corresponds to the Annex I Dunes with *Salix repens* – is also one of five communities that correspond to dune slacks. In the NVC system, Dunes with *S. repens*, characterised by SD16 (a *Salix repens-Holcus lanatus* community) is regarded as a drier form of dune slack. The differences in composition and

physiognomy of the five dune slack communities – SD13, SD14, SD15, SD16 and SD17 – are related to variations in the frequency and extent of ground-water fluctuations, the time since colonisation of the bare sand began and the intensity of grazing (Rodwell, 2000).

There were two distinct situations in which Dunes with *Salix repens* was recognised in the current project. The less common scenario was seen at The Raven (site 035), Strandhill (site 133) and Mullanasole (site 142), where relatively small, quite clearly defined areas of the habitat were found in small clearings in exotic conifer plantations. Interestingly, these were also the only sites at which some of the more unusual *Salix repens* companion species listed in the Interpretation guide to Annex I habitats such as *Carlina vulgaris* (Carline thistle) and *Pyrola rotundifolia* (*Round-leaved wintergreen*), were noted. These species are diagnostic of the mesophilous and xerophilous communities that characterise *Salix repens* dunes.

The frequency with which the habitat was noted in conifer plantations (extensive woodland or forestry in Irish sand dunes is quite uncommon), suggested that the presence of the trees had a role in altering the hydrological conditions at the sites, perhaps by lowering the ground-water table and creating the drier conditions that cause a successional change from wet slack vegetation to the drier *Salix repens*-dominated communities.

In the other, more common scenario, *Salix repens* dunes were mapped at sites where the habitat existed - usually within a mosaic structure with dune slacks and/or fixed dunes - at the drier edges of slacks, or as was the case at Castlegregory, mostly on small, raised hummocks, distributed throughout a sizeable slack area. In this case, accumulated drift sand may have created the drier, more elevated hummocks that initiated the succession from wet slack to drier *Salix repens* communities. At Strandhill, in addition to the small, discrete area within the conifer plantation, there is also a larger area in the north of the site, in which *Salix repens* is common throughout a wide area of fixed dunes, in which little or no distinct dune slack habitat was identified. In these situations there were no notable companion species, and the habitat was recognised solely by the presence of *Salix repens* as a significant element of the flora.

The CSM typical species list for Dunes with *Salix repens* monitoring stops contains only seven species, all of which are common fixed dune species, which illustrates the general lack of significant defining characteristics, besides that of the presence and generally bushy growth form of *Salix repens*. Among the typical species for the habitat are *Carex flacca* (Glaucous sedge), *Festuca rubra* (Red fescue), *Lotus corniculatus* (Common bird's-foot-trefoil) and *Ononis repens* (Common restharrow).

Part of the difficulty in reaching a clear understanding of the habitat is that phytosociological studies did not form part of present survey, nor were there any previous such studies on these habitats in Ireland available for use the purposes of comparing the data collected in the present survey. There are also few, if any comprehensive histories of sand dunes available that could have provided information on long-term successional changes from wet slack to drier *Salix repens*-dominated communities.

It must also be remembered that the NVC communities are based on British data and may not necessarily be appropriate for Ireland. A more comprehensive study of the habitat in Ireland, including hydrological and phytosociological investigations, in addition to the data collected here, may lead to a more thorough understanding of all the issues.

Although the forest plantations at some sites may be creating the hydrological conditions that favour colonisation by *Salix repens* and its companion species, the presence of extensive exotic planting will probably encourage the perception that these areas are of little conservation value. Much of the Raven is within a statutory nature reserve and the site has recently been the focus of some attention by NPWS staff for the purposes of implementing various conservation management strategies. The situation with the other sites is less favourable, with Strandhill in particular the focus of some speculation regarding proposed developments. The fact that at a number of sites the habitat is found in clearings within exotic conifer plantations, emphasises the need to complete a thorough study of the habitat, particularly as these examples of the habitat are especially interesting in that they seem to be defined by more than the presence and growth form of *Salix repens*.

Regardless of the outcome of any phytosociological and/or hydrological studies on *Salix repens* dunes, a significant proportion of what continues to be regarded as Dunes with *Salix repens* is likely to occur in mosaics with dune slacks and/or fixed dunes. Satisfactory mapping and monitoring of the habitat will therefore require the consistent application of a suitable method for dealing with habitat mosaics, such as those outlined in Section 4.2.1.

Perennial vegetation of stony banks (1220)

Perennial vegetation of stony banks or 'perennial shingle' differed from the other habitats in the project as it is not, strictly speaking, a sand dune habitat. The surveyed sites represent only a subset of the total national resource of Perennial vegetation of stony banks, as the habitat frequently exists on beaches in the absence of sand dune systems.

Because of the nature of the habitat, whereby vegetation can be naturally very sparse throughout, the typical species target for monitoring stops was not rigidly determined during the survey and the presence of as few as two species was generally considered sufficient for the attribute to pass. The negative indicator species limit was set at 5% cover however, although only a single monitoring stop failed on this attribute. The distinction between unvegetated shingle or cobble and Perennial vegetation of stony banks should perhaps be clearly defined with a certain minimum vegetation cover, above which the shingle is deemed to be referable to Perennial vegetation of stony banks.

Other vegetation types, such as grassland, heath and scrub can also develop on more mature, stable shingle banks and it would be helpful to establish guidelines on the point at which vegetation can no longer be considered as belonging to Perennial vegetation of stony banks, but to one of the more stable communities mentioned.

4.2 MAPPING

There are few digital maps available of a sufficient quality or accuracy to enable direct comparisons with the results of the current project. The majority of previous habitat maps have been produced by hand from data that was largely drawn onto copies of 6"maps. In previous surveys, while fieldwork was carried out at most sites, its accuracy was constrained by a lack of GPS technology and/or colour aerial photographs such that the distribution of particular habitats is indicated but not accurately quantified. Many of these maps have not been updated for some time and so, merely reflect the presence of a habitat rather than quantifying its actual extent, e.g. strandline. During the current survey, a number of mapping and habitat identification problems manifested, which required assumptions to be made. While they have some bearing on the precision of the mapping, it is envisaged that direct comparisons may be made after the next monitoring cycle.

4.2.1 Habitat Mosaics

Habitats that occur in mosaics presented difficulties in terms of mapping and in estimating the extent of each individual habitat within the mosaic area, e.g. at Strandhill (site 133) the fixed dune area in the northern half of the site contains some small, clearly defined patches of Dunes with Salix repens (H2170), which amounted in total to less than 1ha. However, further areas of *Salix repens*-dominated grassland, that were also referred to Dunes with *Salix repens* occur throughout the area mapped as fixed dune. For the purposes of conservation status assessment, the total '*Salix repens* dune' area (incorporating that part within the fixed dune mosaic) was estimated at 10ha.

When using this approach, the estimated portion of Dunes with *Salix repens* in the mosaic area should be subtracted from the fixed dunes total area when reporting the total fixed dune area and when assigning a conservation status assessment to the habitat. The affect of including the estimated habitat mosaic area in the conservation status assessments for both habitats clearly results in an overstatement of the total sand dune habitat area and leads to discrepancies between total mapped areas derived from GIS maps, and habitat areas derived from the total assessed areas.

Rather than mapping the mosaic area as part of the more extensive habitat (typically fixed dunes), an alternative approach which should be considered, involves the use of a distinct 'mosaic' polygon on the site digital map, with an appropriate legend incorporating the relevant habitat names, e.g. 'Fixed dunes/Dunes with *Salix repens* mosaic'. However, it would still be necessary in this case to estimate the relative proportion of the total area occupied by each habitat, so that the total sand dune area is not overstated.

The extent of each habitat within a mosaic may be estimated by a simple visual assessment of the zone, or alternatively numerous random mapping points throughout the mosaic area may provide an adequate estimate of the relative proportions of each habitat. In the latter case, the mapping points can be included as a theme on the site digital map for comparison with future monitoring surveys.

4.2.2 Bare Areas

There were a number of sites at which extensive bare areas were mapped separately from the surrounding sand dune habitat and therefore excluded from the total habitat

area derived from the site digital map. In these cases, it was necessary to take account of the bare areas in the conservation status assessment of the relevant habitat, as they had to be considered as part of the total habitat area. This led to discrepancies between the total mapped area of habitats and the total area derived from conservation status assessments. It would be preferable to map these areas as part of the habitat in which they are found, and where necessary or desirable, distinguish them from the adjacent intact habitat by including them on the site digital map as a separate polygon within that habitat. This would eliminate any discrepancies between the total areas derived from the site map and that derived by the adding together of all the areas for which a conservation status was established. It would also reflect the fact that cycles of erosion and re-vegetation are part of the natural dynamics of sand dune systems.

If very large bare areas are to be mapped separately from the adjacent intact habitat, it would be advisable to select a minimum threshold area beyond which the bare zones are mapped to ensure a consistent approach.

4.2.3 Invasive Species

Substantial stands of invasive scrub species were sometimes mapped as scrub on the site digital maps, and therefore excluded from the total area of the habitat in which they were found. However, there was no consistent minimum area threshold, above which these species were always mapped separately and excluded from the sand dune total areas. In the future, a consistent approach to dealing with the issue should be implemented. It may be preferable to retain all or almost all such stands within the areas of sand dune habitat to which they naturally belong (most frequently fixed dunes) and account for the compromised conservation status of the habitat by a negative structure and functions and/or future prospects assessment. Alternatively, the areas concerned may, as was the case with a number of sites in the present survey, be considered as no longer part of the functioning dune system and therefore not mapped as sand dune. In these cases, an assessment of the amount of natural sand dune area lost should be estimated and discussed in the relevant site report.

4.2.4 Forestry Plantations

The mapping of forestry plantations on natural dune areas presented similar problems to those that arose in the mapping of scrub areas. Large-scale exotic conifer plantations on natural sand dune areas were mapped at a number of sites such as The Raven (site 035), Mullanasole (site 142) and Strandhill (site133). In each of these cases, the plantations were mapped separately from the adjacent fixed dune area and therefore excluded from the calculation of total sand dune extent. However, it seems that the removal of significant numbers of trees (which is currently proposed for the management of The Raven) could see a quite rapid rehabilitation of sand dune vegetation, which would, in the future, lead to an expansion of the area mapped as sand dune.

Again, a consistent approach to the issue would be desirable, in which either the plantations are mapped as part of the sand dune habitat they occupy (usually fixed dunes), and the damage caused to the dunes factored into the relevant conservation status assessment, or they are retained as forestry areas with a distinct mapping polygon indicating the boundaries of the sand dune area (and therefore produced a measurement of the area) that has been affected.

4.2.5 Miscellaneous Developments/Intensive Agriculture Damage

At many sites, areas within the natural sand dune zone have been altered to such a degree, by a variety of activities, that they are no longer considered to be part of the functioning dune system and were not mapped as such. Typical reasons for the exclusion of these areas included the development of 'one-off' houses or the loss of habitat to intensive agricultural land use. The boundaries of the modified or destroyed dune areas were usually identified by reference to site maps, particularly the site 6'' maps, which often pre-date the observed damage and/or developments and include habitat symbols as a theme, and by observations made during site visits. A decision was made during the course of the project to estimate the extent of these zones by their inclusion on the site digital maps as separate polygons and to refer explicitly to these areas in site reports. However, this approach was not uniformly applied from the outset, with the result that the digital maps of a number of sites from the first two phases of the project require updating to ensure a consistent application of method.

4.2.6 Semi-Fixed Dunes

Semi-fixed dunes, the transition zone between mobile dunes and fixed dunes, could legitimately be mapped as either of these two habitats. However, because the equivalent NVC community (SD7) is included in the EU Interpretation Manual of European Habitats as a category corresponding to the Annex I fixed dune habitat, it was mapped as part of the fixed dune area at each site. The only NVC category corresponding to the mobile dunes Annex I description is the SD6 *Ammophila arenaria* mobile dune community.

Separate polygons on the site digital maps were used to distinguish semi-fixed areas from the rest of the fixed dunes, although this approach was not entirely consistent over the full duration of the project. Future surveying and mapping projects should adopt a consistent approach for all sites, although it should be borne in mind that the collecting of an extra set of habitat boundary mapping points will add to the time taken to complete a site survey. Instead of mapping the semi-fixed dune areas separately, it may be sufficient to estimate the percentage of the entire fixed dune area occupied by semi-fixed dunes.

4.3 ADAPTATIONS TO COMMON STANDARDS MONITORING PROTOCOL FOR SAND DUNE HABITATS

4.3.1 General Adaptations

The Common Standards Monitoring (CSM) sand dune monitoring protocol was not designed solely for the purposes of fulfilling the monitoring and reporting requirements of the EU Habitats Directive on Annex I habitats. As a result, the methodology is not specifically designed to produce separate results for the three parameters of conservation status – area (extent), structure and functions and future prospects – that form the basis of the conservation status assessment of Annex I habitats at individual sites. It was primarily for this reason that the protocol was modified for use in the present survey.

Under the CSM methodology, all attributes relating to habitat area (extent), structure and functions and future prospects are treated within a single assessment, for which only a single overall pass/fail result is produced, although due to the adaptability of the protocol, data produced on both extent and 'other negative indicators' can be

extracted to form the basis of conservation status assessments of habitat area and future prospects, respectively. In the method employed in the present survey, structure and functions and future prospects were dealt with individually, so that a conservation status assessment for each parameter was readily produced.

The CSM method and that employed in the present survey for area (extent) assessment were broadly similar in that both were based on survey work using GPS (Global Positioning System) and the production of detailed GIS (Geographical Information Systems) maps.

In the present survey, the recording of impacts at each site was specifically designed to enable the assessment of future prospects that forms one of the parameters of overall habitat conservation status. Assessments were based on the estimated aggregate affects of all observed or known activities and impacts that were recorded at each site. The CSM method deals with impacts and activities only in the protocols for annual strandline, embryonic, mobile and fixed dunes and only entails the recording of vehicle damage or trampling at vulnerable locations, such as tracks or access points.

The present survey is primarily based on the CSM method insofar as the vegetation structure and functions attributes that were tested in monitoring stops here, were those included as vegetation structure and composition attributes in the CSM methods. In the present survey, all attributes were tested within each monitoring stop and a pass/fail result is produced for *each* monitoring stop, based on all the attributes assessed within the stops, e.g. 12 fixed dune monitoring stops – in each of which the five selected habitat attributes (section 2.4.3.2.2) are assessed - will yield 12 pass/fail results, the relative proportions of which will determine the overall fixed dune structure and functions assessment for each site.

In the CSM monitoring protocol, all vegetation structure and composition attributes (along with the other attributes relating to area and impacts etc.) must satisfy the overall prescribed targets for the habitat to be deemed in favourable condition, although the status of an attribute at any particular monitoring stop on a structured walk may be less than ideal without necessarily detracting from an overall favourable state. If all attributes pass, then the overall result will be a pass. In the protocol employed in the present study, attribute targets may fail within a particular monitoring stop, but only in annual strandline and foredune habitats is there a requirement that all attributes must pass for a monitoring stop to attain an overall pass, e.g. if only four of the five fixed dune attributes meet their targets in a stop, the stop will still be deemed an overall pass. Only in the case of two or more attributes failing is the stop considered an overall fail. The flexibility in generally allowing one attribute to fail in each monitoring stop is considered to be equivalent to the latitude permitted for attributes to be in less than ideal condition in some stops under the CSM method.

One of the potential problems with the current method is that the same attribute could consistently fail in monitoring stops, and yet never result in overall failed stops if all the other attributes pass, e.g. if sward height was overly long in all the fixed dune monitoring stops at a site and therefore failed to attain the prescribed target in each stop, all of the stops will still be deemed to pass overall, if every other attribute passes, because of the need for only four of five attributes to pass each time. Under

the CSM method, if there is an attribute that consistently fails at all stops, it will be recognised in the overall evaluation and will be reflected in a negative rating for the site.

On the other hand, the apparent positive correlations between attributes makes it highly unlikely that one attribute will consistently fail while all others pass, e.g. undergrazing is frequently reflected in both sward height and typical species fails, while agricultural improvement will frequently result in fails in both the negative indicator species and typical species attributes. There also exists the choice to revise structure and functions assessments derived from monitoring stop results, on the basis of best expert judgements. Any such decisions are fully clarified in the individual site reports.

Several of the vegetation structure and composition attributes in the CSM protocol are assessed by applying a modified DAFOR scale to the collated results of all monitoring stops, e.g. in calcareous fixed dune there is a requirement for eight typical species to be present at more than occasional level, which equates to 21-40% of the stops. The percentage of stops in which a species is noted corresponds to a category on the modified DAFOR scale used in the protocol.

When a particular species is noted in a stop, its presence is recorded, and then the total number of appearances of the species in all stops is calculated as a percentage that corresponds to the categories on the DAFOR scale. If ten stops were carried out, then at least eight species must be recorded from three (30%) or more stops to reach 'occasional' level. A species noted in two or less stops (20%) would be considered rare.

In the present survey, there is no cover/abundance requirement for typical species and the targets for species numbers present refer to each monitoring stop, e.g. if less than the target number of typical species are found in a monitoring stop, the typical species attribute fails in that stop.

One of the reasons for adapting the protocol in this manner was to remove the need to record the presence of all species noted in each monitoring stop, which is required under the CSM method. In the current method, if the target number of species is reached in a stop, then the attribute is deemed to pass and there is no requirement to record further information. It should be noted, however, that comprehensive lists of typical species and other information were compiled for all monitoring stops throughout the survey, as much of the data collected here represents baseline information for many of the sites. The data was also necessary for the ongoing development of the method, which formed a central objective of the project.

4.3.2 Habitat Attribute Target Selection

The setting of structure and functions attribute targets is a somewhat subjective process insofar as deciding what should constitute favourable condition in habitats is, to some extent at least, a matter of opinion, e.g. one could legitimately decide to set the fixed dune typical species target at a number well in excess of the current target of six species, in the belief that the diversity of species seen at the best-developed and intact sites should represent the standard by which all sites are judged.

However, pragmatism will dictate that the standards realised at these sites should not be the only benchmark by which targets are set for all sites, as there are various factors at sites, relating to land use (recreational pressures and agricultural management etc.) and edaphic conditions, that will limit the diversity of species and make the most rigorous standards unrealistic and unattainable.

Co-ordination between EU member states as to what constitutes good condition in habitats would be very difficult, due to the number of variables that apply over such a large area, incorporating several distinct biogeographical regions with different land use histories and current management regimes etc.

In the current survey, the attribute targets were generally not altered radically from those advised in the British JNCC methodology (the monitoring protocol on which the current survey was based). The targets were never more stringent than those of the JNCC, but were frequently slightly less so, primarily because of the relatively depauperate nature of the Irish flora and the consequent expectation that species diversity in Irish sand dunes may be somewhat less than that of Britain. In some cases, i.e. the dune heath habitats, appropriate attributes and targets for Ireland have yet to be resolved, hence the need for comprehensive surveys of these habitats.

When assessing the suitability of attribute targets, it may be useful to consider the correlation between the activities and impacts recorded in habitats and the numbers of habitat attributes that fail to reach the prescribed targets, e.g. where there are a certain number of damaging impacts of high or medium intensity that affect a certain minimum habitat area over a large number of sites, one would expect to also see a certain minimum number of failed attributes and monitoring stops. If the attribute targets are not reflecting the undesirable activities that are frequently noted in the habitats, it may be appropriate to introduce more stringent targets.

Any significant correlation between attribute fails in monitoring stops (Section 3.3), i.e. the frequency with which two attributes fail in the same stops, may point to a need to modify one or both of the attribute targets. The correlation may indicate that fails in both of the attributes are indicative of the same impact and activity

4.3.3 Habitat specific Adaptations to Common Standards Monitoring protocol for sand dune habitats

Annual vegetation of driftlines (1210)
The CSM protocol requires one species to be present at Frequent level and another to be at least Occasional.

The modified target here required only the presence of a single species, without a stipulation as to its cover/abundance value.

Reducing the typical species requirement to just the presence of a single species (without any cover/abundance qualifying criterion) means in affect that the presence of the habitat is in itself sufficient for the typical species attribute to pass, which in turn suggests that there is little point in including the attribute within the habitat monitoring stop protocol.

However, a review of the survey data illustrated that annual strandline vegetation was often dominated by a single species, including in many cases where there was a relatively luxuriant growth of that species and/or a relatively large expanse of habitat.

Employing a typical species target of two or more species would therefore not appear to be justified. Over time, information on the long-term trends in the extent and species composition of strandline habitats will be available, at which point it may be appropriate to tailor the attribute targets to each sand dune site, e.g. at a site where annual strandline habitat has been consistently characterised by two or more species, a typical species target such as 'two species present' may be appropriate, whereas the current target of the presence of a single species may be appropriate for those sites at which monospecific stands are the norm. Alternatively, long-term data may indicate that there are frequently no reliable trends in vegetation composition at particular sites, making the current target appropriate for all sites.

In the meantime, it may be advisable to include an overall typical species cover estimate for the entire habitat, based on a simple visual assessment, which can also be used for the purposes of comparison with future monitoring surveys.

Perennial vegetation of stony banks (1220)

The CSM guidance on Perennial vegetation of stony banks includes 'at least two species Abundant and two Frequent' as the target for characteristic species. In this case the species are referred to 'positive indicators' rather than typical species, probably because, as is recognised in the document, it is unwise to give conclusive guidance on the attribute. The vegetation of shingle banks surveyed here naturally comprise pioneer communities, which may range from only a few summer annuals, to communities of short-lived perennial species where shingle beaches have been stable for a few years. It was therefore not appropriate to set one typical species target for all sites. In the present survey, all characteristic species (Appendix 4) were noted and may be used to set site-specific targets in future monitoring cycles.

'Presence of man-made structures' was retained on the habitat fieldsheets here, although there were no specific targets set, and any negative indicators were more likely to be reflected in an unfavourable assessment of future prospects, rather than in a negative result for structure and functions. The attribute is included on the fieldsheet in recognition of the importance of noting any impediments to shingle movement. The artificial redistribution of shingle material at a site could also be considered under this attribute, although the surveyor may also interpret this as a negative factor in the assessment of structure and functions.

Embryonic shifting dunes (2110)

The CSM typical species target requires at least one of *Elytrigia juncea* (Sand couch) and *Leymus arenarius* (Lyme–grass) to occur at Frequent level (40%).

The modified target here required the cover of the two species, singly or combined to be at least 25% within monitoring stops.

The list of target species and the overall target for negative indicator species were the same here as in the CSM protocol, except for the provision that *Hippophae rhamnoides* (Sea buckthorn) must always be included among the list of negative

indicator species in Ireland, unlike in the UK, where it is regarded as native in some sites.

The flowering and fruiting attribute was modified here to include an assessment of the percentage cover of dead/unhealthy typical species material in each monitoring stop. The inherent variability or unpredictability of flowering through the course of a growing season suggested that the inclusion of the plant health provision was likely to provide a more robust analysis of poor condition – usually due to sediment depletion and loss of mobility in the dunes – than would otherwise be the case. This was borne out by the fact that this was the most commonly failed attribute in the habitat (Table 3.6) and was therefore the most effective means of highlighting poor condition in the habitat.

Shifting dunes along the shoreline with Ammophila arenaria (white dunes) (2120)
The CSM typical species target requires at least one of *Ammophila arenaria* (Marram) and *Leymus arenarius* (Lyme–grass) to occur at Frequent level (40%).

The target employed in the current survey requires that the cover of *Ammophila arenaria* (Marram) and *Leymus arenarius* (Lyme–grass), singly or combined should be at least 25% within monitoring stops.

As was the case with embryonic dunes (see above) the plant health attribute included an assessment of the cover of dead/unhealthy typical species material in addition to the flowering and fruiting requirement. Again, this was by far the most common attribute to fail in monitoring stops, suggesting it was the most effective in illustrating the poor condition that was a feature of part, or all, of many sites.

The list of target species and the overall target for negative indicator species were the same here as in the CSM protocol, except for the provision that *Hippophae rhamnoides* (Sea buckthorn) must always be included among the list of negative indicator species in Ireland, unlike in the UK, where the species is native in some eastern sites.

Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)
The CSM methodology distinguishes between calcareous-based fixed dune and acidic fixed dunes, and recommends different targets for the occurrence of typical species - at least 8 present at more than occasional level in the case of the former, and at least 6 present at more than rare level for the latter. A separate list of typical species is provided for each, although there is considerable overlap between the two lists.

In order to apply the correct set of typical species for acidic dunes (the less common of the two), it would be necessary to plan field surveys with specific information on the occurrence of each fixed dune type. Recognising acidic dunes in the field without prior knowledge may prove difficult, particularly as they are characterised not only by floristic criteria, but also on soil characteristics. Due to a lack of the necessary information, the two types of fixed dune were not distinguished or delineated during the present survey. If the two zones are to be distinguished in future surveying, then information on where they exist, based on species assemblages, soil studies, and local knowledge etc., will have to be collated on the relevant sites. However, the total

lichen cover in each monitoring stop was noted during the present survey as a crude indicator of decalcified fixed dunes.

A single list for all fixed dunes - based on the CSM calcareous fixed dune typical species list was used in the current project. Of the species on the CSM list, only *Astragalus danicus* (Purple milk-vetch) was not included on the list used here as, in Ireland, it is only known from the Aran Islands. It is included as an indicator of local distinctiveness at both Eararna (site 091) (on Inishmore) and Inishmaan (site 090) and may be included among the typical species at those sites.

Following a preliminary review of results and on the advice of NPWS staff, the following species were added to the original CSM list:

- *Anthyllis vulneraria* (Kidney vetch)
- *Campanula rotundifolia* (Harebell)
- *Centaurium erythraea* (Common centaury)
- *Cerastium diffusum* (Sea mouse-ear)
- *Koeleria macrantha* (Crested hair-grass)
- *Poa pratensis* (Smooth meadow-grass)
- *Polygala vulgaris* (Common milkwort)
- *Taraxacum* agg. (Dandelion)

The CSM calcareous fixed dune guidelines require 'at least eight species present at more than an occasional level'. This was modified here to six species present, without any qualifying cover/abundance requirement. Although over 15% of all monitoring stops failed the attribute (Table 3.7), this figure would have been somewhat higher had the original CSM target been retained.

A number of the species show a marked regional distribution pattern. Of these, the most clear-cut example is *Ononis repens* (Common restharrow) - an almost constant feature of sand dunes on the east and south coasts that is all but absent from the west coast. On the other hand, *Campanula rotundifolia* (Harebell) and *Koeleria macrantha* (Crested hair-grass) both have a fairly westerly distribution. The existence of regional differences in the typical fixed dune flora may require the modification of species lists for each region. However, as the number of species on the current list with a discernible regional bias is so few, and the species include some with a west coast distribution and others with an east coast distribution, there will probably be no need to introduce any such modifications. A number of uncommon species, including *Arabis hirsuta* (Hairy rock-cress) and *Asperula cynanchica* (Squinancywort), which are not on the typical species list, but which may be worthy of inclusion as Indicators of local distinctiveness, also have distinct westerly distribution patterns.

As is the case with foredune habitats, *Hippophae rhamnoides* (Sea buckthorn) is always considered to be a negative indicator species in fixed dunes, as it is non-native throughout the entire coast.

The CSM fixed dune sward height target requires short turf of 2-10cm to comprise 30-70% of the total area. The upper limit was revised here to 20cm to take account of the sites - particularly those on the east coast - at which livestock grazing does not form part of the management regimes. It may be appropriate over time to employ different targets for grazed and ungrazed sites, as the CSM target probably better

reflects the desired vegetation structure in a sustainably grazed site, whereas such a target will often be unattainable in sites which do not have a grazing element to their land use management.

Semi-fixed dunes
Semi-fixed dunes, the transition zone between mobile dunes and fixed dunes, were mapped as part of the fixed dune area at each site (Section 4.2.6). The CSM guidance does not include any specific advice in the fixed dune protocol on how to deal with the fact that the fixed dune attributes and targets are not appropriate for semi-fixed dunes, due to the fact that they are naturally species-poor and contain large areas of bare sand.

In the initial phases of this project, monitoring stops in semi-fixed dunes were often extended to 4m x 4m, as this was a more appropriate size for meeting the targets such as those for typical species diversity. However, the practice was not continued throughout the project, as it still did not satisfactorily deal with some issues, such as the assessment of percentage bare ground area.
In future, it may be preferable to consistently identify semi-fixed dune zones by separate polygons on the site digital maps and assess the habitat characteristics by a visual assessment of the entire area. Any negative factors, such as negative indicator species or damaging impacts and activities that are observed, can, if necessary, be listed separately from those affecting the rest of the fixed dune area, although they should be dealt with in the fixed dune conservation status assessment.

Decalcified fixed dunes with* Empetrum nigrum *(2140)& Atlantic decalcified fixed dunes (Calluno-Ulicetea) (2150)
Because of the rarity of dune heath habitats in Ireland, the lack of previous data on the known or potential dune heath sites and the fact that almost all of the sites were visited only in the final phase of the project, it was not feasible to propose significant modifications to the CSM dune heath monitoring protocol before the completion of the project. The CSM guidance for the habitats had also proved inappropriate for monitoring all potential Irish dune heath sites. For this reason, all sites at which a number of typical species occurred and which were not damaged through the affects of undesirable impacts and activities, were provisionally considered to be in favourable condition for structure and functions.

The difficulties encountered in assessing dune heath habitats are discussed elsewhere in this report (Section 4.1).

Dunes with* Salix repens *(2170)
The CSM typical species target requires two or more species to occur at frequent level (41%+) and a further two or more to be at least occasional (21%+) from a list of seven species. Here, the minimum number of species required was retained at four, although the qualifying stipulations regarding cover/abundance were dropped. Two species - *Galium verum* (Lady's bedstraw) and *Carlina vulgaris* (Carline thistle) were added to the list on the advice of NPWS staff.

The CSM target for *Salix repens* condition includes the stipulation that the species must be at least Frequent (>40%). The attribute is not particularly suited to assessing within monitoring stops, as the species may be unevenly distributed throughout the

habitat, with the result that a low percentage cover in some stops may under-represent the total cover through the habitat. In view of this, the monitoring stop requirement was set at only 10% cover, with the added proviso that total cover in the habitat (estimated by visual assessment) should be at least 25%.

The targets for the habitat may yet be revised, pending the outcome of any future hydrological, phytosociological or other surveys that may elucidate some of the difficulties involved in defining the strict distinction between it and humid dune slacks (Section 4.1).

Humid Dune slacks (2190)

The CSM protocol for dune slacks includes 'range of zones' among the attributes listed under the heading of vegetation structure. The targets for the attribute include the presence of all dune slack communities at a site, from embryonic dunes with a high percentage of bare ground, to those with more closed vegetation and up to 33% cover of Salix repens. Early dune slack successional stages should also be at least occasional. However, the comments associated with the attribute explain that further research is required to define the attributes of early dune slack successional stages.

Also, the 'range of zones' attribute clearly cannot be assessed under the monitoring stops protocol adopted in the current survey, in which attributes are assessed within 2m x 2m squares. The CSM protocol requires a visual assessment over the whole site during a structured walk to confirm the presence of the various successional stages over the entire site.

The experience of the present survey would appear to confirm the assertion that further research into the characteristics of early stage slacks is required, as the dune slacks encountered were almost exclusively determined as either wet or dry, with few, if any, references to pioneer dune slacks.

Separate typical species lists for pioneer, wet, old wet, dry mature and saline influence (Appendix 4) were compiled by NPWS staff, which represents a change from the CSM guidelines, in which a single list of 15 species is used regardless of slack type. The most extensive lists are those for wet and old wet, which differ only in the structure of *Salix repens* The CSM protocol also includes the necessity for at least four species to occur at frequent level, and two or more others to occur at least occasionally. The presence of four species, with no stipulation on cover/abundance was adopted as the typical species target in the present survey.

The CSM guidelines recognise that the dune slacks typical species list proposed there is not necessarily finalised. A number of species not included on the CSM typical species list, nor on any of the five separate lists used in the current survey, including *Filipendula ulmaria* (Meadowsweet), *Epipactis palustris* (Marsh helleborine), *Ophioglossum vulgatum* (Adder's-tongue), *Succisa pratensis* (Devil's-bit scabious), *Lythrum salicaria* (Purple-loosestrife) and *Linum catharticum* (Fairy flax) were noted in several of the slacks surveyed. Adding these to an Irish list of typical dune slack species should be considered.

At least two of these species, however, *Epipactis palustris* (Marsh helleborine) and *Ophioglossum vulgatum* (Adder's-tongue), are uncommon enough to be considered as indicators of local distinctiveness.

The other attributes included in dune slack monitoring stops had the same targets as those in the CSM protocol. Only 5.1% of all dune slack monitoring stops failed the overall criteria, which, given the significant number and intensity of impacts that often impinge on the habitat, seems somewhat low. It may be that more stringent attribute targets may be needed for the purposes of identifying dune slacks in which the habitat condition is less than favourable. Should this be the case, the typical species target may - as the only one of the CSM targets that was altered – be modified again.

Machairs (21A0)

The CSM machair monitoring protocol has separate typical species lists for Grassland, Crop and Fallow habitat, as the method is designed for both machair grassland and arable land. Wet machair is not dealt with in the protocol, as that element of the habitat is apparently dealt with as dune slack. The present survey employed two lists, one for dry machair and one for wet machair. The dry machair typical species list is similar to the CSM grassland list, but with the addition of *Achillea millefolium* (Yarrow) and *Bellis perennis* (Daisy), both of which are common constituents of machair in Ireland and the omission of *Heracleum sphondylium* (Hogweed), which is a common species of rough and disturbed grassland and not of any apparent value as a typical machair species. The wet machair list was compiled with the advice of NPWS staff and is composed of nine of the more common species found in wet machair habitats in Ireland (Appendix 4). Only two of the species on the wet machair list - *Carex arenaria* (Sand sedge) and *Prunella vulgaris* (Selfheal) – are also on the CSM grassland list.

The crop and fallow species lists were of little relevance to the present survey, as cultivation is now all but unknown in Irish machair. The CSM machair grassland typical species attribute requires at least six typical species to be present and at least Occasional (21%+). In the present survey, six species are also required in dry machair, and four in wet machair, but without any qualifying cover/abundance specification in either case.

The CSM sward height target specifies only that the height of machair grassland should exceed 8cm in July or August. This target was not appropriate for the present survey, as most of the Irish machair sites – unlike the Scottish sites in which cultivation generally forms a major part of the land use - are quite intensively grazed. The target was amended to a sward height range of 2-10cm, which was effective in highlighting the many instances of overgrazing and also the less commonly noted undergrazing. However, the precise meaning of the target may be somewhat vague and open to a subjective interpretation. It would be appropriate to include a certain percentage cover stipulation, e.g. at least 60% between 2-10cm height.

The machair flowering target specifies that most machair flowers should be able to set seed – to at least Frequent level – depending on the time of year visited. No specific recommendations were made as to the degree of latitude that may allowed when surveys are carried out outside of the optimum time period. As the attribute may be

particularly important in highlighting overgrazing - which is one of the most common and widespread management problems in Irish machairs - a precise description of the target range should be established.

4.3.4 Other General Habitat Attribute Comments

4.3.4.1 Habitat Zonation

In addition to the attributes for habitat extent, 'other negative indicators' and those that correspond to the structure and functions attributes used in the current survey, the CSM protocol includes Range of zones (Zonation) as an attribute for strandline, embryonic, mobile and fixed dunes and machair habitats. In each case, the target requires zonation to be intact over at least 95% of coastal frontage. In the present survey, it was not assessed as an individual attribute, but was included within the extent assessment of habitats, although there was no specified minimum percentage of coastal frontage. There was, therefore, some subjectivity on the part of the site report authors in determining the degree to which zonation contributed to the overall extent assessment, although the estimates of loss or accretion of habitat retained the primary significance in reaching the judgements. The CSM target of intact zonation across 95% of coastal frontage was deemed to be quite unrealistic, and does not reflect the reality around much of the Irish coastline, particularly on the west coast, where embryonic dunes are frequently undeveloped due to factors such as the depletion of sediment and exposure to severe wind and wave action. Furthermore, it appears to be in the nature of habitats at many sites to simultaneously accrete and erode in different areas, without suffering a net loss of area.

In any case, the attribute is not of critical importance, as any erosion events, or other disruption to the natural mobility of systems attributed to human-induced pressures, are always accounted for in a negative assessment of habitat extent and/or future prospects.

The zonation attribute is also included in the CSM dune slack protocol, but in that case refers to a requirement for all dune slack communities, from pioneer to old, dry types, to be present. As the current survey proceeded, a review of the data suggested that the attribute should not be employed here, as there were few, if any, pioneer type slacks noted, nor were there any relevant hydrological data available which may have provided a clearer insight into the formation and successional transitions between slack types. As with a number of other issues regarding Dune slacks and Dunes with *Salix repens*, phytosociological and hydrological data may be required in conjunction with monitoring data, in order to set appropriate targets for structure and functions attributes.

4.3.4.2 Bare ground

The CSM target for bare ground includes not only the requirement for the amount of bare ground to fall below a certain threshold – always 5% or 10%, depending on the particular habitat - but that some minimum amount of bare ground should be present.

In the present survey, the requirement for the presence of a minimum area of bare ground was not included, as it is not unusual for a small number of 2 x 2m monitoring stops at a site to lack any measurable area of bare ground. The bare ground component of a grassland is often mostly accounted for in several discrete bare patches such as blowouts, so its absence from a certain number of monitoring stops

may give a distorted view of the situation over the entire area. Although it would be highly unusual for a dune grassland to lack a certain minimum area of bare ground, the overall site scenario was observed and any significant discrepancy with the monitoring stop result accounted for, if necessary, in a modification of the overall structure and functions assessment.

4.4 THE STATUS OF SAND DUNE HABITATS IN IRELAND

Ireland has a long and varied coastline for a country of its size. The major cities and large concentrations of the population are situated along the coastline. As part of the coastal zone, sand dunes have for a long time been used for a variety of purposes, from recreational to agricultural and much of the country's industry is located on or near the coast (Neff, 1998). Most of the sites in the current survey are declining in condition, having been adversely affected to varying degrees by natural erosion, compounded by the intense pressures from human activities.

Coastal erosion has always been seen as one of the main threats to coastal habitats and is more pronounced on the soft, eastern coastline than on the western seaboard. Much of Ireland's soft coastline is low and is susceptible to tidal surges and storm activity. A number of severe storms since the 1980's have accelerated the rates of erosion, to the extent that coastal zone management has become an issue that needed addressing (Brady, Shipman & Martin, 1997). Coastal protection work carried out in the past involved the construction of relatively simple hard structures built in response to periodic emergencies without investigations of even the short term implications of such structures on the coastline as a whole. Many examples of small-scale coastal defence works exist around the county, which have been installed to prevent land losses in response to local erosion problems (Devoy, 2000).

Present erosion problems may worsen as a consequence of climatic change and projected sea level rises. An important initiative developed for use as a code of practice for managing erosion in an Irish context was ECOPRO - Environmentally Friendly Coastal Protection (Dollard, 1996). More recently, a manual developed for county engineers and other parties interested in coastal management (McKenna *et al*., 2000), provides a clear synopsis of the ecology, threats and impacts, regulatory issues and management ideals for the successful retention of beaches as both a recreational and conservation resource.

While most of the sites in the current survey have been affected to varying degrees by natural erosion, their overall decline has been compounded by a number of impacts, both natural and human, which combined have determined the overall conservation status of the habitats.

Sand dunes are a valuable asset and a finite resource, which have been considerably developed and are under increasing pressure and competition for further development and use. The apparent demand for tourist facilities such as holiday homes, hotels caravan parks, car parks and golf courses etc., has resulted in large areas of the national sand dune resource having been lost or at least significantly altered. On the East coast, long stretches of the coastline are heavily urbanised, or are within easy reach of large numbers of people. There is little scope for large-scale development in many areas and the pressures on the sand dune resource is largely linked to the

provision of amenity resources. However, on the South and West coasts, increasing pressures on coastal systems exist, as represented by a number of development categories in urban expansion – residential, retirement/second homes and tourist complexes.. This potentially reduces their sustainability. In addition, water abstraction is another problem, which although not quantified as part of this survey, is known to be impacting on the hydrological integrity of some habitats, particularly dune slacks.

Recreational activities come in a variety of forms and were common at many of the sites that were surveyed. The main activities affecting sand dunes are trampling and general overuse of the dune system through social gathering, walking, golf courses, and camping & caravans. Pedestrian damage, littering, horse-riding, motor vehicles including quad bikes can compact the soil, lead to the creation of tracks and undermine the vegetation integrity, which accelerates the damage to dune systems and can accelerate erosion. Owing to the population density on the East coast some of these activities were more pronounced, such as at the more popular and easily accessible beaches such as North Bull Island or Brittas Bay. Lower population densities on the west coast, however, or the relative isolation of site or its agricultural management, means that some sites are less intensively impacted by recreational use.

Regional variation in land management can be seen in the almost total absence of grazing impacts from East coast sites, and the frequency with which several impacts under the general grazing category are a major impact on the condition of sand dune systems in the south and particularly, West coast sites.

In general, cattle were the main grazing animals, while sheep are also common on the West coast. Through their sheer numbers, rabbits, which were noted at a number of sites must be considered when discussing grazing animals. Grazing can be considered a positive affect in terms of landscape management and the creation of habitat mosaics e.g. within fixed dune grassland. However, there is great variation in the level and intensity of the overall grazing pressure. In many cases, such was the influence of grazing regimes on the vegetation that it is regarded as a negative impact. Agricultural improvement of the land was commonly noted, with a subsequent increase in the cover of negative indicator species such as *Senecio jacobaea* (Common ragwort) and other agricultural weeds. Where livestock were concentrated into defined fields, poaching and supplemental feeding, which can lead to localised enrichment of the soil, were often recorded. Increasingly this has become a problem on machair systems. Originally many would have been open commonages, but strip-fencing of the land has resulted in many machair systems being seriously damaged, through the concentration of grazers.

Conversely, the abandonment of agricultural practices such as the removal of grazing animals can also have a detrimental impact on the condition and diversity of the dune habitats. Thus the rank nature of many fixed dune swards is indicative of the absence of grazing. While some species are indicative of and are commonly recorded in maturing dune systems e.g. *Pteridium aquilinum* (Bracken) and *Rubus fruticosus* (Bramble), their spread can go unchecked in the absence of trampling by livestock and they are considered as negative indicator species. On the East coast, where agriculture was not significant, another negative indicator species *Hippophae rhamnoides* (Sea buckthorn) is commonly planted for protection and is spreading at the expense of other dune habitats.

4.5 FUTURE MONITORING

One of the primary aims of the Habitats Directive is to maintain habitats and species in favourable conservation status e.g. the need to maintain extent, structural functioning of a habitat and its species richness. The overall conservation status for all of the habitats reported on in this survey is either *unfavourable-inadequate* or *unfavourable-bad*.

Table 4.1 summarises the prospects of the sand dune systems at each site, if no action were taken to improve the condition of the individual sand dune habitats. The reader is reminded that full details of each site and its overall conservation assessment are contained in the individual site reports contained in Volume II of this report.

As this was the first comprehensive survey of Irish dune systems, sites that had no intact sand dune systems or where only highly ephemeral habitats such as strandline or foredunes were recorded, are retained on the updated inventory. This is done on the understanding that they may develop into more substantial systems, or they may disappear and subsequently be removed from the inventory. The prospects at these sites are rated N/A.

All other sites have been ranked as follows: Poor, Poor-moderate, Moderate, Moderate-good and Good. These ratings represent a summary of a sand dune systems prospects and do not necessarily reflect the overall conservation assessment of a particular habitat at that site, which are comprehensively detailed in Volume 2 of this report. Few sand dune systems have been listed as Good in terms of its future prospects, indicating that there is need for improvement.

The current survey, which was conducted over three years, will serve as a baseline for comparison with future surveys. Changes in extent and habitat functioning will be easily quantifiable. A 6-yearly monitoring cycle has been proposed for all EU member states, after which they must report on the conservation status of all Annexed habitats and species. It must be emphasised that coastal systems are both dynamic and fragile ecosystems and many of the habitats are vulnerable to impacts and threats of erosion, recreational use and land management.

Table 4.1 Summary table listing individual sand dune systems and their overall condition and prospects if current threats and impacts continue. A full explanation of each site is included in the individual site descriptions (Volume 2).

Sand dune site Code & Name	Type of sand dune system	Condition of sand dune system	Prospects of sand dune habitat
001 - Cruisetown	Sandhills	Largely destroyed	Poor
002 - Baltray	Sand dune system	Eroding at northern end, accreting at southern end	Moderate-good
003 - Mornington	Sand dune system	Accreting at northern end, eroding at southern end	Moderate
004 - Laytown	Sand dune system	Scrub spreading and land acquisition	Poor
005 - Rush	Sand dune system	Eroding and scrub spreading	Poor
006 - Portrane	Sand dune system	Recreational disturbance & spread of scrub	Poor

(cont'd)

Sand dune site Code & Name	Type of sand dune system	Condition of sand dune system	Prospects of sand dune habitat
007 - Malahide Island	Sand dune system	Good	Moderate-good
008 - Ireland's Eye	Sandhills	Bracken spreading	Poor-moderate
009 - Portmarnock	Sand dune system	Declining, due to loss of habitat and erosion	Moderate
010 - North Bull	Sand dune system	Good, but heavy recreational use	Moderate-good
011 - South Bull	Sand dune system	Good, but heavy recreational use	Moderate-good
012 - Killiney	Shingle-dominated beach	Highly disturbed	Poor
013 - Kilcoole	Shingle-dominated beach	Highly disturbed - curtailed by coastal defences	Poor
014 - Ballybla	Shingle-dominated beach	Highly disturbed and eroding in places	Poor
015 - Magheramore	Glacial cliffs	N/A	Poor
016 - Magherabeg	Sand dune system	Range of habitats, Encroaching scrub	Moderate
017 - Brittas	Sand dune system	Declining. Serious erosion & intensive recreational use	Moderate-good
018 - Mizen Head	Sand dune system and associated fen	Declining. Change of hydrological patterns and lack of grazing	Moderate-good
019 - Pennycomequick	Sand dune system	Declining. Bracken-dominated fixed dunes	Poor
020 - Arklow North	Small sand dune system	Disturbed, with bare ground and scrub spreading	Moderate
021 - Arklow South	Small sand dune system	Highly eroded and installation of coastal protection	Poor
022 - Askintinny	Cliffs	Little extant habitat at foot of cliffs	Poor
023 - Kilpatrick	Sand dune system	Declining. Impacted by agriculture & spread of scrub	Moderate
024 - Kilgorman	Sandhills	Dominated by *Hippophae*-scrub	Poor
025 - Courtown	Destroyed - Coastal defences installed	Highly disturbed	Poor
026 - Ardamines	Destroyed - Coastal defences installed	Some accretion of sediment near rock armour	Poor
027 - Donaghmore	Sandhills	Remnants. Habitat loss to recreational development	Poor
028 - Cahore North	Sand dune system	Accretion at front of system. Bracken spreading	Moderate-good
029 - Cahore South	Sand dune system	Spread of Bracken and *Hippophae*	Poor-moderate

(cont'd)

Sand dune site Code & Name	Type of sand dune system	Condition of sand dune system	Prospects of sand dune habitat
030 - Kilmuckridge	Sand dune system	Accretion at frontline & human-induced destruction of fixed dunes	Poor
031 - Tinnaberna	Glacial cliffs	N/A	Poor
032 - Ballynamona	Glacial cliffs	N/A	Poor
033 - Ballynaclash	Sand dune system	Moderate recreational use	Moderate
034 - Curracloe	Sand dune system	Heavy recreational impacts	Moderate
035 - The Raven	Sand dune system	Accretion at southern end	Moderate-good
036 - Rosslare	Remnant sand dune system	Attempts at management have increased some habitat	Poor
037 - St Helen's	Sandhills	Eroded back to cliffs	Poor
038 - St Margaret's	Sandhills	Eroding and heavy recreational use	Poor
039 - Carnsore	Sand dune system	Heavily disturbed and erosion	Poor-moderate
040 - Tacumshin	Sand dune system	Moderate disturbance	Moderate-good
041 - Ballyteige Burrow	Sand dune system	Relatively undisturbed system. Some lowering of watertable	Moderate-good
042 - Bannow Island	Sand dune system	Sheltered but disturbed	Moderate
043 - Grange	Sand dune system	Eroding at North, accreting in south	Poor-moderate
044 - Duncannon	Sand dune system	Land development & encroachment of scrub	Poor
045 – Woodstown	Sandhills	Heavy recreational impacts	Poor
046 – Tramore	Sand dune system	Heavy recreational impacts	Moderate
047 – Bunmahon	Sandhills	Heavily disturbed and erosion	Poor-moderate
048 – Clonea	Sandhills	Eroding and heavy recreational use	Poor
049 – Spit Bank	Shingle ridge	Highly disturbed	Poor
050 – Cunnigar Point	Sandhills	Undergrazed	Moderate
051 – Ardmore Bay	Sandhills	Heavy recreational impacts and erosion	N/A
052 – Whiting Bay	Cliffs	Eroding glacial cliffs	N/A
053 – Ballyvergen East	Sandhills	Remnant sandhills. Habitat loss to erosion	Poor
054 – Ballymacoda	Sandhills	Narrow band of dune habitat remaining	Poor
055 – Shanagarry	Sandhills	Narrow band of dune habitat remaining	Poor
056 – Garrettstown	Sandhills	Heavy recreational impacts & coastal Protection	Poor
057 – Harbour View	Sand dune system	Moderate recreational impacts	Moderate
058 – Inchydoney	Sand dune system	Heavy recreational impacts & Bracken spreading	Moderate-good

(cont'd)

Sand dune site Code & Name	Type of sand dune system	Condition of sand dune system	Prospects of sand dune habitat
059 – Dirk Bay	Sandhills	Partially destroyed	Poor
060 – Castlefreke	Sand dune system	Bracken spreading	Moderate-good
061 – Owenahincha & Little Island Strand	Sandhills	None at Owenahincha Recent dune recontouring at Little Island Strand	Poor (Owneahincha), Moderate (Little Island Strand)
062 – Warren	Sand dune system		Moderate
063 – Sherkin Island	Sandhills	Remnant sediment	Poor
064 – Barley Cove	Sand dune system	Heavily disturbed and erosion	Good
065 – Ballydonegan	Sandhills	No sand dunes Heavily disturbed and erosion	Poor
066 – Derrynane	Sand dune system	Well managed. Heavy recreational impacts	Good
067 – Waterville	Sand dune system	Largely replaced by golf course & extensive coastal protection works	Poor
068 – Rossbehy	Sand dune system	Extensive system, heavily utilised in localised areas only	Moderate
069 – Lough Yganavan	Inland lake	No Fixed dune	N/A
070 – Inch	Sand dune system	Not Surveyed	Good
071 – Ventry	Sandhills	Significant loss of habitat. Erosion & Land use	Poor
072 – Ballyferriter	Sandhills	Heavily eroded	Poor
073 – Ballydavid	Sandhills	Heavy recreational impacts Erosion	Poor
074 – Fermoyle	Sand dune system	Significant agricultural impact.	Destroyed (Main site-Tombolo). Good at (Drom Hill sub-site)
075 – Castlegregory	Sand dune system	Heavy recreational, grazing & other localised impacts	Moderate-good
076 – Derrymore Island	Vegetated pebble beach	Not a sand dune system	N/A
077 – Banna Strand	Sand dune system	Heavy recreational and agricultural impacts	Poor-moderate
078 – Ballyheige	Sand dune system	Heavy agricultural impacts. Localised recreational impacts	Poor-moderate
079 – Ballybunion	Sand dune system	Heavily disturbed and erosion	Poor
080 – Beal Point	Sand dune system	Moderate agricultural impacts	Poor-moderate
081 – White Strand (Doonbeg)	Sand dune system	Dune system much reduced since development of golf course	Moderate
082 – Lough Donnell	Sandhills	No longer a sand dune system	N/A
083 – Lurga Point	Sandhills	Heavily disturbed and erosion	Poor

(cont'd)

Sand dune site Code & Name	Type of sand dune system	Condition of sand dune system	Prospects of sand dune habitat
084 – Spanish Point	Sandhills	Remnant system - heavily disturbed and erosion	Poor
085 – Lahinch	Sand dune system	Much reduced owing to golf courses and coastal protection works	Poor
086 – Fisherstreet	Sandhills	No longer a sand dune system	N/A
087 – Fanore	Sand dune system	Relatively intact dune system despite recreational pressures	Moderate
088 – Bishopsquarter	Sandhills	Remnants sand hills	Poor
089 – Inisheer	Sand dune system	Open areas outside airstrip highly disturbed	Poor-moderate
090 – Inishmann	Sand dune system	Although fragmented by airstrip, machair system is relatively intact	Moderate-good
091 – Eararna	Sand dune system	Machair system is less extensive due to airstrip. Grazing from livestock & rabbits	Moderate-good
092 – Portmurvy	Sand dune system	Small beach is highly disturbed and controlled by seawalls	Moderate-good
093 – Barna	Vegetated pebble beach	No longer a sand dune system	N/A
094 – Finish Island	Machair	Island not visited	Moderate-good
095 – Mweenish island	Machair	Erosion and grazing impacting in places	Moderate
096 – Mason Island	Machair	Although grazed, small machair system is relatively intact	Moderate-good
097 – Dog's Bay	Machair	Heavily used in places. Erosion measures installed to combat erosion	Moderate-good
098 – Doolan (Murvey)	Machair	Seriously overgrazed by sheep	Poor
099 – Ballyconeely	Machair	Still relatively intact despite numbers of sheep	Moderate
100 – Aillebrack	Machair	Significant recreational & grazing impacts	Moderate
101 – Doonloughan (Truska)	Machair	Significant grazing impacts	Moderate
102 – Mannin Bay	Machair	Significant grazing impacts	Moderate
103 – Leagaun	Machair	Significant grazing impacts	Poor-moderate
104 – Omey Island	Machair	Heavy grazing & recreational impacts	Poor-moderate
105 – Augrusbeg	Machair	Significant grazing impacts	Poor-moderate

(cont'd)

Sand dune site Code & Name	Type of sand dune system	Condition of sand dune system	Prospects of sand dune habitat
106 – Inishbofin	Sand dune system	Erosion of site counteracted by recent installation of soft coastal protection	Moderate-good
107 – Gowlaun	Machair	Erosion and heavy recreational impacts	Poor
108 – Dooaghtry	Machair	Serious grazing impacts	Poor
109 – Lough Cahasy	Sand dune system	Significant grazing impacts	Poor-moderate
110 – Cloghmoyle	Sand dune system	Heavy recreational impacts and erosion	Moderate
111 – Bartraw	Sandhills	Heavy recreational impacts and erosion	Moderate
112 – Rossmurrevagh	Machair	Considerable grazing pressure and erosion	Moderate-good
113 – Keel Lough	Machair	Disturbed machair system – recreational and coastal protection works	Moderate
114 – Lough Doo	Machair	Excessive grazing by sheep and recreational pressures impact this system	Moderate
115 – Corraun Point	Machair	Small, agriculturally managed	Poor
116 – Fahy	Sandhills	Not visited	N/A
117 – Trawboy	Machair	Machair is fragmented, remainder of system is relatively intact	Moderate-good
118 – Kinrovar	Machair	Destroyed through agricultural use	Poor
119 – Dooyork	Machair	Relatively intact	Moderate-good
120 – Doo Lough	Machair	Relatively intact	Moderate-good
121 – Srah South	Machair	Fairly intact, but recreational damage	Moderate
122 – Srah North	Machair	Agriculturally damaged	Poor
123 – Inishkea North	Machair	Considerable grazing impacts	Moderate
124 – Aghleam	Machair	Significant agricultural improvement	Poor
125 – Leam Lough	Machair	Significant agricultural improvement	Poor
126 – Cross Lough	Machair	Significant agricultural improvement	Poor
127 – Termoncarragh Lough	Machair	Significant agricultural improvement	Poor
128 – Garter Hill	Machair	Significant grazing impacts and erosion	Poor
129 – Lackan	Sand dune system	Despite some development, relatively intact	Moderate
130 – Ross	Sand dune system	Agricultural improvement	Moderate
131 – Bartragh Island	Sand dune system	Other than grazing, relatively intact	Moderate-good

(cont'd)

Sand dune site Code & Name	Type of sand dune system	Condition of sand dune system	Prospects of sand dune habitat
132 – Inishcrone	Sand dune system	System modified by presence of golf course and other recreational facilities	Moderate
133 – Strandhill	Sand dune system	Due to airport, forestry and sewerage treatment plant, highly fragmented dune system	Moderate
134 – Coney Island	Sand dune system	Erosion and significant rabbit populations	Poor
135 – Rosses Point	Sand dune system	Other than embryonic habitat, system fringing golf course is highly disturbed	Moderate
136 – Yellow Strand	Sandhills	Remnant dunes only. Agriculturally disturbed	Poor
137 – Streedagh Point	Sand dune system	Largely undergrazed. Areas prone to erosion	Moderate
138 – Trawalua Strand	Sand dune system	Relatively intact system, but recreational activities are impacting	Moderate
139 – Bunduff	Machair	Relatively intact system, but recreational activities are impacting	Moderate-good
140 – Finner	Sand dune system	Highly disturbed system largely due to presence of army camp and agricultural management	Poor-moderate
141 – Rossnowlagh	Sand hills	Highly fragmented system due to development, erosion and recreational use	Poor
142 – Mullanasole	Sand dune system	Highly disturbed site	Poor
143 – Mountcharles	Sand hills	Over-intensive stock rearing	N/A
144 – Inver	Sand hills	Remnant sand hills & agricultural improvement	Poor
145 – Fintragh	Sand dune system	Highly disturbed site with man-made structures	Poor-moderate
146 – Glen Bay	Sand dune system	Some agricultural improvement	Moderate
147 – Maghera	Machair	Grazing pressure is impacting much of the system	Moderate
148 – Sheskinmore	Sand dune system	Some of loss of habitat due to erosion and recreational threats	Moderate-good
149 – Clooney	Machair	Declining due to development & agricultural management	Poor-moderate

(cont'd)

Sand dune site Code & Name	Type of sand dune system	Condition of sand dune system	Prospects of sand dune habitat
150 – Roshin Point	Sand dune system	Agricultural improvement & maturing dune system resulting in spread of negative indicators	Moderate
151 – Lettermacaward	Machair	Recreational & agricultural pressures has resulted in machair system	Poor
152 – Rutland Island	Sand hills	Not visited	N/A
153 – Keadew	Sand dune system	Some positive grazing manegement	Poor- moderate
154 – Cruit Lower	Machair	Recreational pressures threaten site as does lack of cohesive agricultural management regime	Poor
155 – Kincaslough	Machair	Development and recreation are impacting this system	Moderate
156 – Carnboy	Machair	Loss of habitat to airport. Undergrazed in large parts of the system	Moderate
157 – Derrybeg	Machair	Presence of golf course and land developments. Considerable grazing by sheep	Moderate
158 – Gola Island	Machair	Owing to isolation, system is undergrazed	Moderate-good
159 – Lunniagh	Machair	Recreational and development impacts on machair	Moderate
160 – Dooey	Sand dune system	Undergrazed. Some recreational impacts e.g. tracks	Moderate-good
161 – Ballyness Bay	Sand dune system	Dune grassland is negatively impacted by agricultural management	Moderate
162 – Rinclevan	Sand dune system	Relatively intact	Good
163 – Dunfanaghy	Machair	Recreational pressures and unsuitable grazing regimes threaten the system	Moderate
164 – Marble Hill	Sand dune system	Largely invaded by bracken	Poor
165 – Ards	Sand dune system	Mature, ungrazed system	Moderate
166 – Rosapenna	Sand dune system	Loss of significant habitat to golf course development	Poor
167 – Tranarossan	Machair	Previously damaged by illegal caravan parks. Mostly agriculturally impacts	Moderate

(cont'd)

Sand dune site Code & Name	Type of sand dune system	Condition of sand dune system	Prospects of sand dune habitat
168 – Melmore	Machair	Large caravan park and some overgrazing	Moderate-good
169 – Lough Nagreany	Sand dune system	Intact system but agriculturally disturbed	Moderate
170 – Doaghmore Strand	Machair	Relatively intact but agriculturally disturbed	Poor-moderate
171 – Gortnatraw	Machair	Some agricultural and recreational impacts	Moderate
172 – Maheradrumman	Machair	Machair is agriculturally improved, whilst fixed dunes are largely undergrazed	Moderate
173 – Ballymastocker	Sand dune system	Historically impacted by golf course, & current recreational activities coupled with grazing regime	Moderate
174 – Fahan	Sand dune system	Highly disturbed	Poor
175 – Crummies Bay	Sand hills	Undergrazed and scrub encroachment	Moderate
176 – Lenankeel	Sand hills	Front is prone to erosion, whilst the rear is disturbed	Poor-moderate
177 – Tullagh	Machair	Significant agricultural disturbance & recreational threats	Poor
178 – Doagh Isle	Machair	Largely undergrazed with loss of habitat to golf course	Moderate
179 – Lag	Machair	Some areas of agricultural intensification	Moderate
180 – White Strand	Vegetated pebble beach	Storm beach with some dune habitat towards rear	Poor-moderate
181 – Culdaff	Machair	Undergrazed and high recreational use	Poor-moderate

4.5.1 RECOMMENDATIONS FOR FUTURE MONITORING

4.5.1.1 Specialisation

The JNCC protocol was developed as a relatively rapid methodology for assessing habitats. Indeed, one of its key tenets is that specialist knowledge isn't required. All that is required is a basic understanding of the habitats under survey, and an ability to identify the common species. Although only a few moss or lichen species are needed to characterise certain sand dune habitats, it must be recognised that other species occur that may be included under indicators of local distinctiveness (section 4.5.1.6). Another problem for potential surveyors is when plants are not flowering or on closely grazed sites where plant material is much reduced and difficult to identify.

4.5.1.2 Aerial Photographs

The usefulness of aerial photographs has been recognised by the JNCC protocol as it facilitates a clear overview at a site. The use of the most recent aerial orthophotographs is to be encouraged at all times, in facilitating field surveys. This is

particularly true of coastal systems, which are dynamic and can experience change over relatively short periods of time.

The resolution of current year 2000 series aerial photographs (as used in this survey) is such that strandline and foredune habitats are not clear nor is it always possible to distinguish between Dunes with *Salix repens* and humid dune slacks. The reliance on aerial photographs in delineating habitats is not prudent in terms of monitoring coastal habitats for the foreseeable future, aerial photographs should only be used to compliment fieldwork.

The 2005 series aerial photographs are currently in the final stages of being ortho-rectified by the Ordnance Survey of Ireland. It is likely that the next monitoring programme in 6 years will use the 2005 series photographs. However, it is worth bearing in mid that this set of photographs was taken over 3 consecutive years (Rob Ovington - NPWS, pers. comm.), so that it is conceivable that aerial coverage at 2 adjacent sites might be from different time periods.

Local knowledge of the site and up-to-date vegetation maps, which are considered vital for pre-planning, were not available for most sites. In several cases, the year 2000 aerial photographs pre-date changes in land management or significant natural events, such as episodes of severe erosion. The problem is clearly illustrated at Grange (site 043), which is situated at the mouth of Bannow Bay (cSAC 697). In the 4 years since the aerial photographs were taken, the sand dune system has seen dramatic levels of erosion, with losses of habitat estimated at up to 180 metres at the widest point.

4.5.1.3 Maps

The inclusion of 6'' maps as a theme on the site digital maps is invaluable. Although, in the relatively dynamic environment of sand dune systems, several cycles of large-scale erosion and accretion may have occurred between the production of 6''maps and the present day, the cartographic data is useful, because of the inclusion of habitat symbols as a theme on these maps, in estimating the former extent of the natural sand dune area at sites that have since been greatly modified by developments, afforestation, scrub encroachment or destructive agricultural practices etc.

4.5.1.4 Monitoring Stops

The recommended protocol for future monitoring surveys does not include a compulsion to re-visit the precise monitoring stop locations used here, although these positions were logged (using GPS measurements), included as themes on the site digital maps and recorded in the project database.

Except in the case of severe erosion events, many of the current monitoring stop locations in the more stable habitats such as fixed dunes, machair and dune slacks etc. should, during future monitoring surveys, still correspond to the habitats with which they were associated during the present survey. Nevertheless, repeating the current protocol with any set of monitoring stops, the positions of which are subject to the strictures regarding adequate numbers and spacing etc. outlined in the methodology (Chapter 2) will be sufficient to satisfy the requirements of the protocol. In any case, the relatively dynamic nature of sand dunes will often result in the extent and location of the more ephemeral habitats - particularly those of the strandline and foredunes -

changing significantly between successive monitoring cycles, rendering at least some of the current set of monitoring stops redundant for the purposes of future surveys.

As failed sward height in monitoring stops can, depending on whether the sward is excessively short or excessively long, indicate either overgrazing or undergrazing, it would be advisable to include a clear indication of this in the survey reporting format, with a range of values. The inclusion of an additional column in the project database monitoring stops section is recommended.

It is worth re-emphasising that it is essential to position monitoring stops in such a way as to adequately represent the situation at a site, e.g. if 10% of the area of fixed dunes at a site is composed of a long undergrazed sward, then roughly 10% of the monitoring stops should be in this area. If too great a number of stops are placed there, there may be a disproportionately high number of attribute fails, which in turn may result in failed monitoring stops.

4.5.1.5 Impacts & Activities

There were several commonly observed impacts that did not readily fit into the existing categories in the list used in fieldwork (Appendix 4). It may be useful to consider certain additions or modifications to the list so that these impacts may be accommodated more satisfactorily. Some of the more obvious examples are discussed below:

The burrowing activities of rabbits are often significant in causing, or adding to erosion, in dune grasslands. This activity can currently only be accommodated under *overgrazing by hares, rabbits, small mammals* (146), an impact which although usually also applicable where burrowing is significant, is clearly somewhat different in its affects. It may therefore be desirable to introduce a separate activity code and description for burrowing.

Poaching, or trampling, of soil by livestock is also dealt with in an ambiguous manner in the list of impacts, as *Trampling, overuse* (720) - which may appear to be the appropriate activity under which to describe the impact - is included under the broad category of *Pollution & other human impacts/activities*. An activity listed under the broad category of *Agriculture, forestry* would be more appropriate for describing this impact.

Erosion is only explicitly dealt with under the broad category of *Natural processes* (*biotic and abiotic*) which includes *Erosion* (900) among the subcategories. This is generally taken to indicate an activity that exerts a neutral influence, and the great majority of individual records of the impact in this survey are thus described. However, there are cases where erosion is believed to be caused or exacerbated by anthropo(zoo)genic activities – a scenario for which there are apparently no suitable codes under which the impacts may be described. The inclusion on the list of impacts of one or more codes that specifically refer to erosion as a result of human, or other non-natural interference, may be desirable.

In the face of a growing acceptance that the global climate is now being modified by human activities at a scale beyond any in history, and with sea level rise and increased storm frequency - both of which have serious implications for the affects of erosion

on coastal habitats - among the most recognised results of climate change, it would seem feasible to consider erosion events as non-natural. However, due to the global scale on which these events occur, assessing the degree to which erosion at any or all of the sites may be due to climatic changes brought about by human activities, was clearly beyond the scope of the current survey. Where erosion is believed to have occurred, and there were no clearly discernible anthropo(zoo)genic activities contributing to the impact, it was generally referred to as a natural process and listed under *erosion* (900). There may in the future be a requirement to assess accelerations in the rates of erosion observed in which case erosion, as a purely natural process, may have to be evaluated.

The broad category of '*Human induced changes in hydraulic conditions*' incorporates several impact codes that could be used to describe interference with the natural hydrological functioning of habitats. However, because of the degree to which the management of golf courses (and perhaps other land management activities) can affect adjacent dune habitats, it would be appropriate to employ a specific impact code for water extraction, an activity that probably occurs quite extensively and can clearly have considerable consequences for a number of dune habitats.

Large-scale modifications to a habitat, such as the development of golf courses, may, in addition to a direct loss of habitat, have several other implications, some of which are not accommodated under the existing list of activities impacts. One such impact that could be considered is the fragmentation of habitats that can result from large-scale developments.

The distinction between littering, which is usually thought of as the small-scale disposal of waste and dumping, which generally implies a larger scale activity, may not be sufficiently expressed in the existing activity codes. A new code, specifically referring to littering would be useful, as the activity is currently usually described under activities such as *other pollution or human impacts*/*activities* (790).

Some common land-uses, which apparently cannot be clearly defined with any of the existing impact codes and descriptions, include the presence of cemeteries and car parks within the natural sand dune area. Appropriate codes for these and any other similarly ill-defined impacts, should be considered.

4.5.1.6 Indicators of Local Distinctiveness

Indicators of local distinctiveness, where applicable, should be more firmly established for each site. Each site report currently includes information on whatever rare species, transitions between habitats or other potential Indicators of local distinctiveness, were found. It would be useful to include a section on the topic in each site report (where such features exist), so that information, such as lists of species that occur in transition zones, can be readily accessed and targeted for consideration in future monitoring surveys.

Decisions on the inclusion or exclusion of certain site features in the 'Indicators of local distinctiveness' will have implications for the degree of expertise required to monitor a site, e.g. if a number of rare species are included, then specialist knowledge may be required for monitoring. However, rare species are generally no more inherently difficult to identify than other species, so potential difficulties could be

overcome with the aid of identification manuals. In addition, the locations of rare or interesting species, many of which are potential indicators of local distinctiveness, were often mapped in the current survey, thereby aiding the process of re-finding and identifying them.

The mosses included on the monitoring stop typical species lists are limited to a small number of common, relatively easily identified species, while the easily recognised *Cladonia* and *Peltigera* lichens included on the lists do not require identification to species level.

4.5.1.7 Database

One of the potential shortcomings of the current monitoring stops protocol, is that a repetition of the method, without any site-specific adaptations of the attribute targets, may not adequately reveal a decline (or improvement) in the conservation value of habitats between surveys and reporting cycles, e.g. a drop in the average number of typical species from 20 to 10 in fixed dune monitoring stops at a particular site will, (all other factors being equal) still result in a favourable conservation status assessment. A site-specific basis, e.g. the fixed dune typical species target at a site which has an average of 20 species in monitoring stops may be set at 20 or a figure close to 20, while the target for a site at which the average number of typical species is six should remain at six. However, should future surveys use the same method, it is likely that any precipitous declines in the condition of habitats will be attributable to certain undesirable management practices that can also be reflected in a negative appraisal of future prospects.

If attributes are not to be tailored to each individual site, then additional information should be incorporated into the project database to aid in the identification of trends over time. Monitoring stop fieldsheets contain not only confirmation of the pass or fail result of typical species targets, but also comprehensive lists of the typical species noted in each stop. Species lists or at least the number of typical species found in each stop can therefore be added to the database.

4.5.1.8 Further Studies

It was beyond the scope of this project of this study to address a number of issues, which would greatly enhance our understanding of the overall functioning of the sand dune habitats and would greatly enhance our understanding of sand dune habitats and assist in the decision making process to select sites that would be representative of emergent, established and declining sand dune systems. For example, sediment budget studies would be beneficial in understanding the impacts on the distribution and structure and functions of sand dune systems as a whole and strandline habitats, in particular. Grazing intensity and the carrying capacity of livestock at individual sites also needs to be addressed in future management regimes, if the condition and extent of dune grasslands are to be maintained or improved. The hydrological status needs to be established for individual sand dune systems in order to understand and manage dune slack and machair vegetation in particular.

4.5.1.9 Management Plans

The introduction of management plans is an important step in the conservation management of individual habitats and/or species, as they outline specific objectives

for designated sites. The implementation of these management plans, and their effectiveness, however, needs to be evaluated.

In terms of the total national resource of Annex I sand dune habitats, the overall assessment, using the EU system, indicates that the condition and future prospects are such that none are achieving *favourable* conservation status. This is far from encouraging as it means that current management regimes such as those prescribed – in the increasing catalogue of management plans is largely failing. Improved communications between NPWS and landowners, managers and local authorities is required.

In addition, the current site inspection monitoring programme needs a more cohesive approach to its implementation with shorter time intervals between site visits, particularly at sand dune systems, which are vulnerable ecosystems. It is only through a combination of all of this information that appropriate response/preventative measures might be implemented, which should minimise the damage of potential impacts/threats and halt the decline in the status of Irish sand dune systems and their habitats.

4.5.1.10 Boundary Amendments

It has become apparent, from discussions with staff from Local Authorities, that while conservation and management objectives are often stated targets in County management plans, other concerns such as provision of facilities, amenities and services for users of the beach are prioritised. Part of the reason for this is the difficulty in interpreting the various conservation designations, particularly when it comes to identifying it on the ground. There are often discrepancies between what is identified on a 6" map over which NPWS boundaries are drawn and that which actually occurs on the ground. Therefore a review of the SAC and NHA boundaries in these coastal areas is required, so that these discrepancies can be amended and correct boundaries corresponding to the actual boundaries of Annex I habitats are transmitted to landowners and the planning authorities.

4.6 RATIONALISING THE METHODOLOGY - REPRESENTATIVE SAMPLING

Repeating a survey such as this every 6-years, as required under the EU Habitats Directive, is financially expensive and labour intensive, particularly as all Annexed habitats and species have to be reported on. It would be desirable to revisit every site so that comparisons could be made and undoubtedly, future monitoring programmes should cover all habitats from sites that occur from around the coast, which reflect the following:

- Variation in size and geographical spread
- a range of habitats
- the need for a number of sites from all conservation states – green, amber, red
- Differing management practices including sites where rehabilitation is unlikely to be implemented

However, rationalising the monitoring strategy, while at the same time maintaining a representative picture of the status of sand dune habitats is difficult to determine at present, as there is considerable variation in the condition and land use/management of individual sand dune systems and hence habitats.

Despite the fact that most sand dune systems in Ireland were visited, our understanding of how particular features at a site respond to the various processes and activities is not conclusive e.g. dune heath, dune slacks, etc

One problem that arises from the dynamic nature of sand dune habitats, is that accretion of habitat (particularly in foredunes) may be temporary, and when seen in isolation may give a misleading picture of habitat extent, e.g. accretion in one site may be offset by a loss of area in another unseen adjacent site, or one within the same coastal cell. The build-up of foredune habitat frequently represents no more than the local re-working of eroded sediment, and is often removed by storms.

Site selection for future monitoring should incorporate the following:

1. Sites where poorly distributed habitats occur should be revisited.
2. All sites where the majority of habitats were rated as *unfavourable-bad* during this survey should be revisited, to ascertain any potential improvement in the management regimes/objectives.
3. Thereafter, some of the larger and more complex sand dune systems, which are badly affected through agriculture and recreational use should be monitored.
4. The smaller systems should not be overlooked. It is often these smaller systems that damaging activities e.g. spread of invasive species or unauthorised development of the land, are more pronounced.

It might be assumed that sites where the majority of habitats were considered *favourable* might not necessarily need to be intensively studied. This might only be the case if regular patrolling/monitoring of these sites (e.g. Site Inspection Reporting) indicated that there was little or no apparent change to the sand dune system. It is only when all this information is gathered and an agreed national policy is put in place, that sites and habitats within each management region can be prioritised and proper management plans adopted. This is not to say that sand dune habitats should be homogenous and that each site should be a replica of another, structurally or floristically.

4.7 CLOSING REMARKS

It is now generally accepted that the coastline is a valuable natural resource, and it is only relatively recently that sand dunes have begun to be scientifically appraised to assist in their management. This national survey and report forms the basis of a monitoring programme, essential for tracking changes at coastal sites and also allows the NPWS to fulfil its reporting obligation to the EU. The outputs (site reports, maps and database) will serve as tools for future management and decision making. The implementation of the Habitats Directive requires the provision and enactment of effective management plans so that the conservation value of sites (such as sand dune habitats) is not diminished.

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APPENDIX 1: DRAFT GENERAL EVALUATION MATRIX (PER BIOGEOGRAPHIC REGION) FOR ASSESSING THE CONSERVATION STATUS OF A HABITAT TYPE

Parameter	Conservation status			
Habitat code:	**Favourable ('green')**	**Unfavourable - Inadequate ('amber')**	**Unfavourable - Bad ('red')**	***Unknown (insufficient information to make an assessment)***
Range	Stable (loss and expansion in balance) AND not smaller than the 'favourable reference range'	Small decrease, less than 6% in reporting period (6 years) OR Stable/Small increase but still below 'favourable reference range'	Considerable decrease, more than 6% in a reporting period (6 years)	*No or insufficient reliable information available*
Area covered by habitat type within range	Stable (loss and expansion in balance) or increasing AND not smaller than the 'favourable reference area' AND without significant changes in distribution pattern within range	Stable or small decrease in surface area less than 6% in reporting period (6 years) OR With some losses in distribution pattern within range OR Stable/Small increase but still below 'favourable reference area'	Considerable decrease in surface area more than 6% in reporting period (6 years) OR With major changes in distribution pattern within range	*No or insufficient reliable information available*
Conservation status of the typical species	All typical species in favourable conservation status	Majority of the typical species in favourable conservation status.	Majority of the typical species in unfavourable conservation status.	*No or insufficient reliable information available*
Specific structures and functions	Structures and functions in good condition in all area and no significant deterioration in NATURA 2000 sites.	Up to 25 % of the area is unfavourable as regards its specific structures and functions, e.g. by discontinuation of former management, or is under pressure from significant adverse influences, e.g. critical loads of pollution exceeded.	More than 25% of the area is unfavourable as regards its specific structures and functions, e.g. by discontinuation of former management, or is under pressure from significant adverse influences, e.g. critical loads of pollution exceeded.	*No or insufficient reliable information available*
Future prospects	The habitat is not under significant impact from threats. Excellent / good prospects for its future: long-term viability assured.	The habitat is under moderate impact from threats, slowly declining. Poor prospects for its future: long-term viability not assured.	The habitat is under severe impact from threats, rapidly declining. Bad prospects for its future: long-term viability not assured.	*No or insufficient reliable information available*
Overall assessment of CS	All 'green' OR four 'green' and one 'unknown'	Any combination of 'green' and 'amber' but no 'red' and any one 'unknown'	One or more 'red' with any combination of 'green' and 'amber' and more than one 'unknown'	Three or more 'unknown'

Reference: EU Doc. SWG 04-03/03-rev.3 (Annex E)

APPENDIX 2 - COMMON STANDARDS MONITORING GUIDANCE FOR SAND DUNE HABITATS

A1.1 Introduction

This appendix contains an abridged version of the Common Standards Monitoring guidance for sand dune habitats used in the UK (JNCC, 2004c). It provides the background information upon which the current coastal survey methods and targets used were based and from which the monitoring methods for Irish dune habitats were developed. Details of the habitat attributes used and the targets set for monitoring Irish dune habitats are found in 2.4.3.2.1 and 2.4.3.2.2.

A1.1.1 Strandline, embryonic and mobile dunes

Strandline, embryo and mobile dunes includes Annex I types H2110 embryonic shifting dunes and H2120 shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes') as well as strandline vegetation. Strandline vegetation on detritus deposited at the tidal limit is commonly of the *Atriplex-Beta* type (with *Beta vulgaris* ssp. *maritima* and *Atriplex* spp. – was not described in the British National Vegetation Classification - NVC) which grades to *Honckenya-Cakile* SD2 community (with *Honckenya peploides*, *Cakile maritima* and *Salsola kali*) in areas beyond the reach of all but the most extreme high tide. This assemblage forms a narrow band between the tidal limit and the stable or accreting hinterland of the shore. It is prone to invasion by *Elytrigia juncea*, *Leymus arenarius* or *Ammophila arenaria* forming embryo and mobile dunes. Sea Holly, *Eryngium maritimum* and *Euphorbia paralias* may come to colonise with *Elytrigia juncea* and will subsist along with other survivors of the strandline assemblages, such as *Honckenya peploides*, *Salsola kali*, *Cakile maritima* and *Atriplex* spp.

A1.1.2 Fixed dune grassland

This category includes semi-fixed and fixed dune grasslands, except machair, and includes Annex I habitat H2130. Semi-fixed dune grasslands are characterised by *Ammophila arenaria* and *Festuca rubra* and represent a zone inland where sand deposition decreases. This zone is often found on the lee slopes of dunes. Other typical plants include *Hypochaeris radicata* and *Poa pratensis*. Further inland where sand accretion is no longer significant and there is some soil development, *Ammophila arenaria* is no longer a constant part of the community. The fixed dune grassland contains species such as *Galium verum*, *Cerastium fontanum*, *Trifolium campestre*, *Achillea millefolium*, *Viola* spp and *Rhinanthus minor*, along with mosses such as *Brachythecium albicans* and *Homalothecium lutescens*. Where older, leached sands have been grazed, grassland often includes *Agrostis capillaris*, *Galium aparine*, *Festuca ovina* or *Dicranum scoparium*. Communities with *Carex arenaria* are typical on blowouts or areas revegetating after secondary disturbance.

A1.1.3 Machair grasslands

Machair is a distinctive sand dune formation found in the north and west of Scotland and western Ireland, and includes Annex I habitat H21A0. The vegetation is typical of calcareous to neutral sandy grassland. Typical species of machair grassland include *Festuca rubra*, *Agrostis stolonifera* and *Potentilla anserina* with *Galium verum, Trifolium repens, Lotus corniculatus* and *Thymus polytrichus* on fixed dune grassland. On cultivated machair, fallow species include *Chrysanthemum segetum, Spergula arvensis, Anchusa arvensis, Myosotis arvensis, Sinapsis arvensis, Viola tricolor, Ranunculus acris, Achillea millefolium, Veronica arvensis, Arenaria serpyllifolia, Fumaria* spp., *Polygonum aviculare, Euphorbia helioscopia* and *Atriplex patula.*

It is believed that machair grassland has been modified by man throughout its development. Traditionally, Scottish machair supported extensive grazing regimes and unique forms of cultivation that relied on low-intensity systems of rotational cropping. This traditional agriculture sustained a rich and varied dune and arable weed flora.

A1.1.4 Humid dune slacks

This category includes Annex I type H2190. Early stages in dune slack formation are characterised by communities with the mosses *Bryum pseudotriquetrum*, *Aneura pinguis* and *Campylium stellatum*. Other common dune slack plants are *Carex flacca*, *Sagina nodosa*, *Equisetum variegatum*, *Hydrocotyle vulgaris*, *Juncus articulatus*, and *Mentha aquatica*. Creeping willow, *Salix repens* ssp. argentea, is constant in all communities but becomes more abundant as succession proceeds. Dune slacks are home to nationally rare species such as *Epipactis phyllanthes* (Green-flowered Hellebore) and *Teucrium scordium* (Water germander).

A1.1.5 Dunes with *Salix repens*

This category describes dune slacks where *Salix repens* ssp. *argentea* is dominant and forms a bushy canopy (SD16 in part). Common associates include *Holcus lanatus*, *Carex flacca*, *Agrostis stolonifera* and *Ononis repens*. It corresponds with the Annex I habitat H2170 Dunes with *Salix repens* ssp. *argentea* (Salicion arenariae).

A1.1.6 Dune Heaths

Dune heaths, including H2140 Decalcified fixed dunes with *Empetrum nigrum* and H2150 Atlantic decalcified fixed dunes (Calluno-Ulicetea), are covered in the Lowland heathland monitoring guidance (JNCC, 2004b).

A1.2 Regional variations in British sand dune community and species distribution.

Geographical differences in dune vegetation are complex and several axes of variation may exist: in the UK there is at least as much variation east-west as north-south. Community distribution reflects differences in species distribution. Species such as *Euphorbia portlandica* (Portland spurge) and *Eryngium maritimum* (Sea holly) are mainly confined to the south of the UK, while *Leymus arenarius* (Lyme-grass) has a mainly north-eastern distribution, reaching as far south as the Wash. The *Matricaria maritima-Galium aparine* strandline SD3 community is typical of cooler, wetter strandlines from Northumberland and Merseyside northwards. This is largely a reflection of distribution of *Mertensia maritima* (Oysterplant). The four dune slack communities: *Sagina nodosa – Bryum pseudotriquetrum* SD13 dune-slack, *Salix repens – Campylium stellatum* SD14 dune-slack, *Salix repens – Calliergon cuspidatum* SD15 dune-slack and *Salix repens – Holcus lanatus* SD16 dune-slack were previously unknown in Scotland (Dargie, 1993) but have recently been recorded (Dargie, 2000).

A1.3 Dynamics

Sediment supply comes from eroding coastlines, particularly cliffs, and from the seabed through reworking of glacial deposits. Material is washed up on the shore and is redistributed by the wind when the surface dries out between tides. A breeze of just over 4.5m/s will start moving dry sand.

Some seeds can germinate and grow on the strandline. Such species include *Atriplex* spp. or, in situations beyond the reach of all but the most extreme tides, *Honckenya peploides* or *Cakile maritima*. Around these strandline plants and detritus small patches of sand can accumulate, which are prone to invasion by *Elytrigia juncea*, *Leymus arenarius* or *Ammophila arenaria*, thereby initiating foredune formation. Embryonic dunes are transient and will either be replaced by marram-dominated vegetation or washed away by storms. A supply of new sand is vital for the continued existence of the embryonic community and the long-term survival of the dune ecosystem.

Out of the reach of the highest tide, but where there is still active sand movement, the sandbinding *Ammophila arenaria* is usually dominant. This community is also maintained by constant change and will disappear if the sand stabilises. Where the dune stabilises and the organic content of the soil increases, fixed dune grassland develops. Dune slacks form by erosion of dunes down to the water table; wet sand is not moved by wind. Accretion as a result of succession can lead to a rise in soil levels and the establishment of *Salix repens* ssp. *argentea*, which may lead to scrub or maybe woodland.

In some areas where there is damaged plant cover, natural processes or wind erosion can lead to ‘blow-outs’. These rarely exceed 30m in length before natural stabilising factors come into force. Cycles of erosion followed by stability are part of the natural development of dunes and are essential to the maintenance of diversity. If there is severe, localised erosion from anthropogenic activity, such as that adjacent to car parks, traditional management techniques could be considered, such as fencing off areas or, ideally, building a boardwalk through the dunes.

A1.4 Threats

The construction of sea defences can affect sediment supply; cliff defences will halt cliff erosion and groynes can interrupt longshore drift, which transports sediment in a prevailing direction. Offshore dredging can also affect sediment supply. Hard sea defences can lead to fossilisation of dunes behind sea walls.

Dunes are still threatened from developments such as holiday homes and houses or factories. The traditional agriculture that shaped our dune vegetation has largely disappeared. Low-intensity pastoral

systems have intensified, leading to drastic changes in vegetation through practices such as reseeding and the use of herbicides and pesticides. Relict dunes are still being lost to arable fields. Lack of grazing has caused rapid successional changes on systems, leading to loss of diversity.

Recreation is a further significant factor affecting most dune systems today. Although localised destabilisation from trampling can to some extent mimic grazing, massive destabilisation from heavy usage (e.g. at Camber Sands, Sussex) has a chronic adverse effect on diversity. Golf courses may have protected sand dunes from development but fairways and greens are usually improved grassland and represent fragmentation of the habitat. In addition, the absence of stock and strict control of rabbit populations on golf courses has led to rapid successional change and widespread loss of dune grassland to mesotrophic swards.

A1.5 Attributes and targets

A series of broad habitat attributes has been defined, which should normally be part of the conservation objectives or the management plan for all sites where sand dune is an interest feature. There should normally be at least one target specified for each of the attributes. The targets set out here are for guidance only. They should be interpreted in terms of local knowledge of the site, its history and its surroundings. When a target is not applicable to a particular site it should be ignored, but a record of why the decision was taken should be made.

For sand dune the mandatory attributes to be assessed are:

- Habitat extent
- Physical structure: functionality and sediment supply (strandline, embryo and mobile dune, machair)
- Vegetation structure: range of zones of vegetation
- Vegetation structure
    - sward height (dune grassland, machair)
    - flowering and fruiting (dune grassland, machair)
    - bare ground (dune grassland, humid dune slacks, dunes with *Salix repens*, machair)
    - cultivation pattern (machair)
    - condition of *Salix repens* (dunes with *Salix repens*)
- Vegetation composition:
    - typical species
    - bryophytes (machair)
    - ratio of grass:forbs (humid dune slacks) or cover of broad-leaved grasses (dunes with *Salix repens*)
    - growth form of dune grasses (strandline, embryo, mobile dune)
    - indicators of negative trends (including scrub/tree cover)
- Other negative indicators (negative indicator species and signs of disturbance).

The presence of notable species of vascular plant or other important features (e.g. transitions to other habitats) is considered to be a discretionary attribute (indicators of local distinctiveness). It will not be appropriate to use these ‘quality indicators’ on every sand dune site, but where they are part of the reason for notification of the feature they should form an integral (mandatory) part of the condition assessment.

Guidance is given in the following sections as to what needs to be considered for certain of the above attributes. Where appropriate, some examples are provided of the sorts of targets that should be set.

A1.5.1 Extent

Extent is the most important attribute and must always be assessed. Extent will be subject to natural change, as dune systems are dynamic. Monitoring should identify trends on sites that can then be investigated further to identify causes, or be used to check the effectiveness of current management. The requirement is that net extent of all designated habitats should be maintained, but not at the expense of other designated categories.

A1.5.2 Physical structure - functionality and sediment supply

The construction of sea defences can affect sediment supply: cliff defences will halt cliff erosion and groynes can interrupt longshore drift that transports sediment in a prevailing direction. Offshore

dredging can also affect sediment supply. Hard sea defences can lead to fossilisation of dunes behind sea walls.

A1.5.3 Vegetation structure - range of zones
Zonation is a fundamental attribute of a dynamic sand-dune ecosystem. The range of vegetation zones and the transitions between them should be maintained. In most cases there will be several distinct sand dune zones, typically strandline (with *Cakile maritima, Honckenya peploides, Atriplex* spp.), embryonic dune (sparse cover of *Elytrigia juncea, Leymus arenarius*), mobile dune (more stable dune dominated by *Ammophila arenaria*) and fixed dune grassland (with grasses such as *Festuca rubra, Festuca ovina* and herbs such as *Galium verum, Rhinanthus minor* and *Galium saxatile*). The hindshore may have dune slacks (with *Hydrocoyle vulgaris* or *Salix repens* ssp. *argentea*) or areas of dune heath (considered under separate guidance for lowland heathland).

In practical terms, assessing zonation may also allow a reliable estimate of the extent of each sand dune feature to be made. Assessing embryonic to mobile dune transitions may be relatively straightforward. However, the transition to fixed dune grassland may be more difficult on large, complex hindshore systems, where semi-fixed dune grassland can cover large areas and form a mosaic, and where dune slacks can be a significant feature.

A1.5.4 Vegetation structure - sward height
The target is 30 - 70% of sward to comprise species-rich short turf, 2-10 cm tall. The vegetation structure should be assessed using a structured walk or transects. Target ration between short turf and marram dominated vegetation should be set on a site-specific basis.

Grazing has an important influence on dune vegetation, both undergrazing and overgrazing can lead to loss of species diversity.

A1.5.5 Vegetation structure - bare ground
Fixed dune does not mean ‘static’ dune and an element of instability is a positive attribute: bare surfaces are essential for invertebrates and a cycle of small-scale erosion and recolonisation imparts greater diversity to the system. Bare areas should not exceed 10 %, however.

On individual machair sites a site-specific target for location/proportion of cultivated ground, fallow and permanent pasture should be set. A baseline should be established and targets based on the historical pattern of cultivation. The distribution of cultivated land will change but the proportion in relation to fallow and permanent pasture should remain roughly constant.

A1.5.6 Vegetation composition - typical species
Targets for typical species for each dune type are given in the relevant guidance tables. These are expressed in terms of frequency using DAFOR scale, and are intended to cover the range of variation across the country. In some cases it may be appropriate to substitute other typical species, or increase the number of species for especially rich variants.

A1.5.7 Vegetation composition - growth form of foredune grasses
All foredune grasses require blown sand to thrive. In particular, *Ammophila arenaria* will begin to die back and reduce its flowering if sheltered from further sand accumulation. This plant attribute is a good indicator of the sediment supply to the system. The target is that fruiting heads of foredune grasses should be frequent. The best time for observing this is probably July. However, this target will need to be applied with care; for example in 2002 most of the marram grass in the NW Scottish mainland did not set seed, with no evidence of any decrease in sand mobility.

A1.5.8 Vegetation composition - species indicators of negative trends
The most common negative indicators on sand dunes are scrub species and nitrophilous species: *Hippophae rhamnoides* (except where native on the east coast of England), *Rubus fruticosus, Rosa* spp. other than *R. pimpinellifolia, Senecio jacobaea, Cirsium arvense, C. vulgare, Urtica dioica, Lolium perenne, Arrhenatherum elatius* (except in the *Ammophila Arenaria-Arrhenatherum elatius* SD9 dune grassland) and *Pteridium aquilinum*.

A1.5.9 Other negative indicators

The presence of litter on the strandline or in the dunes is not necessarily a negative attribute, as it will usually have come from the sea, and with it will have come seaweed and seeds.

Burning and physical damage to vegetation (e.g. cutting of marram grass for thatch) could be regarded as damaging if it prevents natural regeneration. Burning - from deliberate setting of grass fires to barbecues on apparently bare sand in a sheltered depression - may kill seeds and seedlings within the soil. If the strandline is lost to beach cleaning, this is a loss of condition.

Winter-feeding of stock may lead to severe trampling damage and nitrification around feeding stations. Stock feeding should, if possible, be transferred to a different part of the agricultural unit, such as adjacent improved grassland

A1.5.10 Indicators of local distinctiveness

Quality indicators are features of a sand dune that make it 'special' but which are not covered by the attributes already described. They should be apparent from the NATURA 2000 forms or other past surveys. This is a discretionary attribute in that it may not be applicable to every site; but where local distinctiveness has contributed to the selection of a site for sand dune it should be mandatory. The target(s) should be tailored to each site. Quality indicators may include the following:

- notable species which are not notified features in their own right
- structural attributes
- associations between sand dune and other habitats e.g. mosaics of vegetation types, transitions to saltmarsh

A1.6 Management and other issues

A1.6.1 Grazing

Grazing by domestic stock, rabbits and other herbivores has had a major influence on European sand dune vegetation. Grazing regime is critical. Undergrazing can lead to a rapid loss of species rich grassland. Overgrazing can also lead to loss of sensitive species, damage to vegetation through trampling and in feeding areas, dominance of nitrophiles such as *Urtica dioica* (Nettle).

Rabbit grazing, in particular, has played a major role in shaping sand dune community structure since the arrival of this animal with the Romans. Myxomatosis reduced the species in the 1950s and has contributed to a general over-stabilisation. On most sand dune sites there has been a trend towards over-stabilisation in the last 30 years, with reduced grazing pressure and the reduction of the rabbit population, combined with introduction of species such as *Hippophae rhamnoides*. Rabbit grazing is not a managed activity and cannot create swards from longer vegetation. In certain circumstances rabbits can overgraze and threaten the habitat by large-scale destabilisation.

A1.6.2 Nutrient inputs

A recent review investigated the likely effect of enhanced nutrient (N) inputs to sand dunes (Jones *et al.*, 2002). The report indicated lichens and bryophytes and associated communities (e.g. lichen rich and acidic grassland SD11, SD12 and dune slacks SD13-17) to be most sensitive. At a broader level, enhanced N inputs may lead to an increase in later successional stages at the expense of earlier stages. Management practices that remove nutrients from the system can mitigate the effects of N inputs but may damage fragile components. Management should focus on creating new successional cycles to provide habitat for early successional species and replace that lost by accelerated succession.

A1.7 Recommended visiting period and frequency of visits.

The suggested visiting period is May to October. In addition to the basic six-year monitoring cycle, we recommend the site be checked more frequently if possible.

A1.8 Methods of assessment

A1.8.1 Data collation

Prior to going out in the field, collate existing information on your site. Aerial photographs are particularly useful. Some NVC information should be available for most sites. Each local team should have a copy of the *Sand Dune Survey of Great Britain* (Radley, 1994), which has original maps for all sites surveyed. In many cases, more recent survey information should be available. The guidance should be read prior to the field visit and the assessment forms need to be tailored to your site. If contractors are used, consultation with local conservation agency staff is essential for selecting routes and stopping places.

A1.8.2 Assessing habitat extent

Habitat extent should be assessed using any previous information available, preferably aerial photographs. If none is available this first reporting round must form the baseline. The source of the baseline must be clearly identified - aerial photography should include source, date (at least month and year) and scale. Field trials have shown that failure to provide some of this information may mean change cannot be measured with respect to the first round. Habitat extent can be traced over aerial photos, followed by ground-truthing to ensure correct interpretation. This can then be compared to recent surveys (e.g. Dargie, 2000) that may form a previous baseline.

Strictly speaking, the separate habitat categories require monitoring for extent individually, but this may require specialist input on large, complex sites. However, the transects used to monitor zonation (where the width of each sand dune feature is estimated) in conjunction with aerial photography, should give a reliable estimate of extent of the individual features. If extent of the habitat categories is considered separately, it is not essential to assess the extent of strandline vegetation, as this is by nature ephemeral and may vanish completely in a summer storm. However, if the strandline has vegetation covering 10% or more this should be recorded (less than this is indicative of exposed sites and it is thus more likely to disappear). Loss of a large proportion of strandline for several years in succession might suggest a negative trend, possibly induced by changes on adjacent coastlines, such as coastal protection works.

Embryonic and mobile dunes are relatively straightforward to identify from aerial photography; inland however, the extent of fixed dune grassland may be more difficult to estimate on large, complex sites. Extent of dune heath should be measured separately. This is usually easily done from aerial photographs, as the heath areas are very dark against the paler grassland. Groundtruthing of aerial photography is always desirable, even if the photography is recent.

If shifting dune is lost to such a degree that fixed dune becomes the most seaward part of any site, this would be assessed as a loss of condition. Any change in extent *must* be quantified, either with a fixed transect or by mapping, in order to inform and facilitate the next round of monitoring.

A1.9 Field Survey

A1.9.1 Structured walk

It is recommended that vegetation structure, vegetation composition and negative indicators for each sand dune feature should be assessed using a structured walk (e.g. a W shaped walk) with at least ten stops within each assessment unit (block, management unit etc.) to avoid excessively variable results. The number of stops should be enough to allow the assessor to have an overview of the site and judge the condition of the feature. To avoid subjectivity in selecting stops and to ensure that as wide an area as possible is covered, general routes with stops based on a map or aerial photograph should be selected before the field visit. This also allows the number of stops per unit area to be determined more consistently. The exact stopping locations will be recorded in the field, using GPS if possible. If contractors are using the guidance, then consultation with local staff on route selection and stopping points is mandatory.

At each stop, the appropriate measures (e.g. percentage cover and/or presence of relevant species) should be assessed within approximate 4 m^2 sampling units. There is no need to measure cover values precisely – simple visual estimates will suffice. It should not take very long (no more than five minutes) to collect all the relevant records at each stop.

The recommended method of selecting the number and location of the stops is not intended to have statistical value, and the final condition of the interest feature is not simply the average of the condition of each stop. On the contrary, each stop should improve the assessor's overview of the state of the site. The following is a quantitative definition of frequency, intended to assist with the assessment of several of the sand dune attributes. This is a version of the well-known DAFOR scale, which has been adapted to the particular characteristics of sand dunes.

- **Dominant:** the species appears at most (>60%) stops and it covers more than 50% of each sampling unit
- **Abundant:** species occurs regularly throughout a stand, at most (>60%) stops and its cover is less than 50% of each sampling unit
- **Frequent:** species recorded from 41-60% of stops

• **Occasional:** species recorded from 21-40% of stops
• **Rare:** species recorded from up to 1-20% of stops

Sward structure can be assessed by taking the average sward height recorded from the structured walk stops.

A1.9.2 Transects (for assessing zonation)
This technique can be used primarily for assessing sand dune zonation, but will also provide an estimate of the width of each sand dune feature and, in conjunction with aerial photography, could be used to give a reliable estimate of extent of the individual features. It is an assessment of where one feature ends and another begins. Transects allow the width of the dune zones to be estimated at a minimum of five locations. Ideally, transects should be based on a map or aerial photograph and selected before the field visit, with locations fixed by GPS. Transects, which should be *repeatable*, will extend from the strandline, through mobile, semi-fixed and fixed dune, to the transition to a landward feature such as a cropped field. Fence posts are not recommended for use as reference markers unless this is unavoidable, as fences are not permanent features. The idea is to pick up trends in the dune edge - is it advancing or retreating? Note however, that losses, which tend to be sudden, are noticed more easily than the slower return of sediment.

A1.10 Other aspects of recording
The routes selected for the structured walk; and the start and finish points of each transect should be marked on a map for future use. Ideally, these should be traced over aerial photos of the site using GIS, to facilitate comparisons on future visits.

Photographs are essential to the condition assessment and should be taken as an accompanying record wherever possible. These should be archived with the assessment file. In some countries photography is a mandatory part of the condition assessment**.**

There are several new technologies being trialled to aid the condition assessment process, such as CASI (Compact Airborne Spectrographic Imager) and LIDAR (Light Detection and Ranging). These may provide a very useful tool for assessing zonation as well as extent.

A1.11 Skills required
It is important that the person carrying out the assessment be capable of identifying those species most likely to be encountered on sand dunes. Fixed dune grassland and dune slacks are particularly diverse habitats and require a high level of plant identification skills. It is helpful if he/she has some understanding of the management and other factors likely to affect sand dunes. Knowledge of the site would also be helpful.

APPENDIX 3: ATTRIBUTES AND TARGETS OF IRISH SAND DUNE HABITATS

Strandline, Embryonic and Mobile dunes

Attribute	Assessment	Targets
Habitat Extent:	Baseline habitat map and aerials.	No change from baseline unless subject to natural changes.
Physical Structure: Functionality and sediment supply	Aerial photographs combined with site visit.	No further anthropogenic factors that lead to a change in the natural mobility of the system. The natural circulation of sediment and organic matter should be maintained where possible.
Vegetation Structure: Range of zones	Transect.	Maintain the overall diversity of habitats while taking into account the dynamic nature of the zones.
Vegetation Composition: Typical Species	Visual assessment of cover at the stops. Using the modified DAFOR scale.	Maintain the presence of species-poor communities with characteristic species (listed at bottom) as follows: Strandline: At least one species occasional throughout the zone. Embryonic: *Elytrigia juncea* or *Leymus arenarius* at least occasional. Mobile: *Ammophila arenaria* or *Leymus arenarius* at least frequent (25%+)
Vegetation Composition: Plant Health of foredune grasses.	Visual assessment of overall health of plant species in each zone.	Healthy plant species indicated by green plant parts above ground and flowering heads when present. Strandline: At least two species occasional throughout the zone. Embryonic: Unhealthy *Elytrigia juncea* or *Leymus arenarius* no greater than 5% Mobile: *Ammophila arenaria* or *Leymus arenarius* no greater than 5%.
Vegetation Composition: Negative indicator species.	Areas of *Hippophae rhamnoides* and other non-native species delineated using GPS device (where possible) and baseline map. Any changes in area to be examined in monitoring phase. Visual assessment of cover at the stops, using the modified DAFOR scale.	Non-natives no more than rare. Any one of the negative indicator species are no more than frequent throughout sward or singly or together cover more than 5%. **Negative indicator species**: *Senecio jacobaea, Cirsium arvense, Cirsium vulgare, Urtica dioica, Lolium perenne, Arrhenatherum elatius*
Other Negative Indicators:	Visual assessment of damage from human activities, such as vehicle tracks, trampling and overuse.	Damage from human activities should be absent or rare.
Indicators of local distinctiveness:	Confirm the presence of rare plants or certain habitats or other features during site visits.	Maintain the presence and extent of the elements of local distinctiveness (site specific).

Typical Species of Strandline, Embryonic Dune and Mobile Dune:
Strandline: *Cakile maritima, Honckenya peploides, Salsola kali, Atriplex* spp.
Embryonic Dune: *Elytrigia juncea, Leymus arenarius, Euphorbia* spp.
Mobile Dune: *Ammophila arenaria, Leymus arenarius, Euphorbia* spp.

Perennial vegetation of Stony Banks – Shingle Strandline

Attributes	Assessment	Targets
Habitat Extent:	Baseline habitat map and aerials.	No change from baseline unless subject to natural changes.
Physical Structure: Functionality and sediment supply	Aerial photographs combined with site visit.	No further anthropogenic factors that lead to a change in the natural mobility of the system. The natural circulation of sediment and organic matter should be maintained where possible.
Vegetation Composition: Typical Species	Visual assessment of cover at the stops. Using the modified DAFOR scale.	Maintain the presence of species-poor communities with characteristic species (listed at bottom) as follows:
Vegetation Composition: Negative indicator species.	Visual assessment of cover at the stops, using the modified DAFOR scale.	Non-natives no more than rare. Any one of the negative indicator species no more than frequent throughout sward or singly or together cover more than 5%.
Other Negative Indicators:	Visual assessment of damage from human activities, such as vehicle tracks, trampling and overuse.	Damage from human activities should be absent or rare.
Indicators of local distinctiveness:	Confirm the presence of rare plants or certain habitats or other features during site visits.	Maintain the presence and extent of the elements of local distinctiveness. This is site specific.
Lichen Cover	Visual assessment of % cover at the stops.	No target – used as additional information.
Presence of man-made structures e.g. rock armour, etc.	Visual assessment.	No target – useful as additional information in relation to habitat dynamics and future prospects.

Typical Species of Shingle Strandline: *Honckenya peploides, Beta vulgaris* ssp. *maritima, Crithmum maritimum, Tripleurospermum maritimum, Rumex crispus, Glaucium flavum, Silene uniflora*

Negative Indicator Species*:* *Senecio jacobaea, Cirsium arvense, Centranthus ruber.* Presence of other non-natives to be noted

Fixed Dunes

Attributes	Assessment	Targets
Habitat Extent:	Baseline habitat map and aerials.	No change from baseline unless subject to natural changes.
Vegetation Structure: Bare ground	Visual assessment of percentage area at the stops, combined with aerial photographs.	Bare ground should be no more than 10% of entire fixed dune habitat.
Vegetation Structure: Sward Height	Visual assessment of cover at the stops. Take an average of the stops.	Sward height between 5cm and 20cm.
Vegetation Composition: Typical Species	Visual assessment at the stops.	Maintain presence of characteristic species as follows: At least six species present. Typical species listed below.
Vegetation Composition: Negative indicator species	Visual assessment of cover at the stops, using the modified DAFOR scale. Areas of *Hippophae rhamnoides* and other non-native species delineated using GPS device and baseline map.	No increase in areas of non-native species. Non-native species no more than rare. Any of the negative indicators no more than frequent throughout the sward; or singly or together, cover no more than 5%.
Vegetation Composition: Scrub/trees	Visual assessment of cover at the stops. Visual assessment of cover of entire fixed dune habitat.	Scrub/trees no more than occasional or less than 5% cover.
Other Negative Indicators:	Visual assessment of damage from human activities, such as vehicle tracks, trampling and overuse.	Damage to habitat should be absent or rare.
Indicators of local distinctiveness:	Confirm the presence of rare plants or certain habitats or other features during site visits.	Maintain the presence and extent of the elements of local distinctiveness. This should be set on a site-specific basis.
Short Turf:	Visual assessment of % cover at the stops.	No target – used as additional information.
Tall Marram:	Visual assessment of % cover at the stops.	No target – used as additional information.
Lichen Cover:	Visual assessment of % cover at the stops.	No target – used as additional information.

Typical Species of Fixed Dune: *Agrostis capillaris, Aira praecox, Anthyllis vulneraria, Arrhenatherum elatius, Campanula rotundifolia, Carex arenaria, Carex flacca, Cerastium diffusum, Cerastium fontanum, Crepis capillaris, Cladonia* spp., *Erodium cicutarium, Euphrasia officinalis* agg., *Festuca ovina, Festuca rubra, Galium verum, Geranium molle, Hypnum cupressiforme, Hypochaeris radicata, Koeleria macrantha, Linum catharticum, Lotus corniculatus, Luzula campestris, Odontites vernus, Ononis repens, Peltigera* spp., *Pilosella officinarum, Plantago lanceolata, Poa pratensis, Polygala vulgaris, Prunella vulgaris, Rhinanthus minor, Rhytidiadelphus squarrosus, Rhytidiadelphus triquetrus, Sedum acre, Taraxacum* agg., *Thymus polytrichus, Tortula ruraliformis, Trifolium repens, Veronica chamaedrys, Viola canina, Viola riviniana, Viola tricolor.*

Negative Indicator Species: *Senecio jacobaea, Cirsium arvense, Cirsium vulgare, Urtica dioica, Lolium perenne, Arrhenatherum elatius, Pteridium aquilinum, Rubus fruticosus*

Dune Slack

Attributes	Assessment	Targets
Habitat Extent:	Baseline habitat map and aerials.	No change in area from baseline survey unless subject to natural changes.
Vegetation Structure: Area of slack	Slack area delineated using GPS device.	Maintain the area of slack.
Vegetation Structure: Bare ground	Aerial photographs combined with site visit.	Bare ground should be less than 5% of slack area.
Vegetation Structure: Forb:grasses ratio	Visual assessment during site visit.	>30% forbs and <70% grasses.
Vegetation Composition: Typical Species	Visual assessment at the stops.	Maintain presence of characteristic species as follows: At least 4 species present. See typical species list at the end of this table.
Vegetation Composition: Negative indicator species	Record any large areas of non-native species on GPS. Visual assessment of cover at the stops. Using the modified DAFOR scale.	No increase in areas of non-native species. No more than one other negative indicator species more than frequent; or singly or together the cover of negative species no more than 5% of the dune slack area.
Vegetation Composition: Cover of *S. repens* spp. *argentea*	Visual assessment during site visit.	Cover of *Salix repens* ssp. *argentea* should be no greater than 40%.
Other Negative Indicators:	Visual assessment of damage from human activities, such as vehicle tracks, trampling and overuse.	Damage to habitat should be absent or rare.
Indicators of local distinctiveness:	Confirm the presence of rare plants or certain habitats or other features during site visits.	Maintain the presence and extent of the elements of local distinctiveness. This is site specific.
Slack Type:	Identify slack type from species composition.	Not a target - Slack types listed below with typical species.

Typical Species of Dune Slack:

1 Pioneer: *Bryum pseudotriquetrum, Carex arenaria, Sagina nodosa, Juncus articulatus,* and *Petallophyllum ralfsii*

2. Wet: *Epipactis palustris, Salix repens* ssp. *argentea* (low, creeping), *Mentha aquatica, Carex arenaria, Carex nigra, Ranunculus flammula, Potentilla anserina, Hydrocotyle vulgaris, Calliergonella cuspidata, Galium palustre, Campylium stellatum, Equisetum* spp., *Anagallis tenella, Juncus articulatus, Juncus acutus*

3 Old Wet: as for wet slack but with bushy canopy of *Salix repens* ssp. *argentea*

4. Dry mature: *Salix repens* ssp. *argentea* (forming bushy canopy) with *Carex arenaria, Holcus lanatus, Leontodon autumnalis, Prunella vulgaris, Potentilla anserina* and typical species of fixed dune habitat

5. Saline Influence: *Glaux maritima, Juncus gerardii, Juncus maritimus,* etc.

Negative indicator species of Dune slacks:

Cirsium arvense, Cirsium vulgare, Cirsium palustre, Lolium perenne, Senecio jacobaea, Urtica dioica, Pteridium aquilinum, Arrhenatherum elatius

Dunes with *Salix repens* ssp. *argentea*

Note that owing to the relative scarcity of this habitat in Ireland, these targets need further refinement

Attributes	**Assessment**	**Targets**
Habitat Extent:	Baseline habitat map and aerials.	No change from baseline unless subject to natural changes.
Vegetation Structure: Condition of *S. repens* ssp. *argentea*	Visual assessment during site visit.	*Salix repens* ssp. *argentea* at least frequent and 5-30cm tall.
Vegetation Structure: Bare ground	Aerial photographs combined with site visit.	Bare ground should be less than 10% of total area of habitat.
Vegetation Composition: Typical Species	Visual assessment of cover at the stops. Using the modified DAFOR scale.	Maintain presence of characteristic species as follows: Two species at least frequent. See typical species list at end of table.
Vegetation Composition: Negative indicator species	Record any large areas of non-native species on GPS Visual assessment of cover at the stops. Using the modified DAFOR scale.	No increase in areas of non-native species. No more than one of the other negative indicator species more than frequent, or singly or together the cover of negative indicator species no more than 5%. See list of negative indicator species at end of table.
Vegetation Composition: Cover of broad-leaved grasses	Visual assessment during site visit.	Combined cover of *Dactylis glomerata*, *Holcus* spp., *Arrhenatherum elatius* <10%
Vegetation Composition: Scrub/trees	Visual assessment during site visit.	In addition to *S. repens* ssp. *argentea* the scrub/trees should be no greater than 5%.
Other Negative Indicators:	Visual assessment of damage from human activities, such as vehicle tracks, trampling and overuse.	Damage to habitat should be absent or rare.
Indicators of local distinctiveness:	Confirm the presence of rare plants or certain habitats or other features during site visits.	Maintain the presence and extent of the elements of local distinctiveness. This is set on a site-specific basis.

Typical species of Dune with *Salix repens:*

Salix repens ssp. *argentea, Carex flacca, Carex arenaria, Festuca rubra, Lotus corniculatus, Ononis repens, Pilosella officinarum, Euphrasia officinalis* agg.

Negative Indicator species:

Cirsium arvense, Cirsium vulgare, Cirsium palustre, Lolium perenne, Senecio jacobaea, Urtica dioica, Pteridium aquilinum, Arrhenatherum elatius

Machair

Attributes	Assessment	Targets
Habitat Extent:	Baseline habitat map and aerial photographs.	No change from baseline unless subject to natural changes.
Vegetation Structure: Bare ground	Visual assessment of percentage area at the stops, combined with aerial photographs.	Bare ground should be no more than 10% of entire machair.
Vegetation Structure: Sward Height	Visual assessment of cover at the stops (Ideally should be carried out in July and August).	Sward height between 2cm and 10cm. May, however be determined on a site-specific basis.
Vegetation Structure: Flowering	Visual assessment at the stops.	At least Occasional. Note Percentage.
Vegetation Composition: Typical Species	Visual assessment at the stops.	Maintain presence of characteristic species as follows: At least six species present. for machair grassland/wet machair. If wet machair only, then four species Typical species below.
Vegetation Composition: Bryophytes	Visual assessment at the stops.	Note species and total % cover. Bryophytes at least occasional.
Vegetation Composition: Negative indicator species	Visual assessment of cover at the stops, using the modified DAFOR scale.	Non-native species no more than rare. Invasive species no more than 5% cover. Any of the negative indicators no more than occasional throughout the sward; or singly or together, cover less than 5%. List of negative indicator species below
Indicators of local distinctiveness:	Confirm the presence of rare plants or certain habitats or other features during site visits.	Maintain the presence and extent of the elements of local distinctiveness. This is set on a site-specific basis.
Short Turf:	Visual assessment of % cover at the stops.	No target – used as additional information.
Fencing:	Visual assessment at the stops.	No target – used as additional information.
Type of Grazing:	Visual assessment at the stops.	No target – used as additional information.

Typical Species

Machair Grassland: *Achillea millefolium, Aira praecox, Bellis perennis, Carex arenaria, Cerastium fontanum, Crepis capillaris, Erodium cicutarium, Euphrasia officinalis, Galium verum, Linum catharticum, Lotus corniculatus, Odontites vernus, Plantago lanceolata, Prunella vulgaris, Rhinanthus minor, Sedum acre, Trifolium repens, Thymus polytrichus, Viola canina, Viola tricolor, Viola riviniana*

Wet machair: *Agrostis stolonifera, Carex arenaria, Carex flacca, Carex nigra, Hydrocotyle vulgaris, Mentha aquatica, Potentilla anserina, and Ranunculus flammula*

Negative Indicator Species*:* *Senecio jacobaea, Cirsium arvense, Urtica dioica, petasites* spp., *Lolium perenne, Phleum pratense* and agricultural grasses

Atlantic decalcified fixed dunes & Decalcified fixed dune with *Empetrum nigrum*

Note that owing to the relative scarcity of this habitat in Ireland and the general lack of typical species, these targets need further refinement

Attributes	Assessment	Targets
Habitat Extent:	Baseline habitat map and aerials.	No change from baseline unless subject to natural changes.
Vegetation Composition: Typical Species	Visual assessment at the stops of 1) Dwarf shrubs 2) Graminoids 3) Forbs	Maintain presence of characteristic species as follows: Dwarf shrubs[1] -1 species from list at least frequent. In addition, presence of *Empetrum nigrum* (occasional) used to differentiate between Atlantic decalcified fixed dune and decalcified fixed dunes with *Emptrum nigrum*. Graminoids[2] - 1 species at least frequent & 2 species at least occasional. Forbs & Lichens[3] – 2 or more species at least occasional Typical species listed below.
Vegetation Composition: Bryophytes and Lichens	Visual assessment of percentage at each stop	At least maintain %cover from baseline information (where applicable)
Vegetation Composition: Negative indicator species	Visual assessment of % cover at the stops	[4]*Senecio jacobaea*, *Urtica dioica*, *Cirsium* spp. and other herbaceous spp. <1%
		Ulex europaeus <25% cover
		[5] Trees, saplings and other scrub <15% cover
		Pteridium aquilinum <10% cover
		[6] Exotic species <1% cover
		Acrocarpous mosses – occasional <25% cover
Vegetation Structure: Bare ground (Not rock)	Visual assessment at each stop	Area undisturbed and bare ground no more greater than 10%
Vegetation Structure: Cover of dwarf shrubs	Visual assessment of cover at each stop	Cover of dwarf shrub species between 25% and 90%
Vegetation Structure: Cover of *Ulex* spp.	Visual assessment of cover at each stop	<50% total *Ulex* spp. cover, with *Ulex europaeus* <25% cover.
Vegetation Structure: Growth phase of ericaceous cover	Visual assessment at the stops. Note % cover of each phase where applicable	Pioneer phase 10%-40%
		Building / Mature phase 20% - 80%
		Degenerate <30%
		Dead <10%
Vegetation Structure: Signs of disturbance	Visual assessment of cover at each stop	<1% of habitat heavily eroded from overgrazing or fire damage
Indicators of local distinctiveness:	Confirm presence of rare plants, certain habitats or other feat. during site visits.	No target – used as additional information. e.g. presence of *Juniperus communis*

Typical Species

[1]**Dwarf shrubs:** *Arctostaphylos uva-ursi*, *Calluna vulgaris*, *Erica cinerea*, *Erica tetralix*, *Ulex gallii*, *Ulex minor*, *Vaccinium myrtillus*, *Emptrum nigrum** (* Presence used to distinguish between Atlantic decalcified fixed dunes and decalcified fixed dunes with *Empetrum nigrum*)

[2]**Graminoids:** *Agrostis spp.*, *Aira praecox*, *Ammophila arenaria*, *Carex arenaria*, *Carex* spp., *Danthonia decumbuens*, *Festuca* spp., *Molinia caerulea*, *Phleum arenaria*, *Trichophorum cespitosum*, *Deschampsia flexuosa**, *Nardus stricta** (* cover<25%)

[3]Forbs & Lichens: ***Armeria maritima, Erodium cicutarium, Galium saxatile, Hypochaeris radicata, Lotus corniculatus, Peltigera* spp., *Plantago lanceolata, Plantago maritima, Polygala serpyllifolia, Potentilla erecta, Rumex acetosella, Scilla verna, Sedum acre, Serratulla tinctoria, Thymus polytrichus, Viola riviniana***

Negative Indicator Species*:*

[4]**Herbaceous & Graminoid spp.:** *Chamerion angustifolium, Cirsium arvense, Dactylis glomerata, Digitalis purpurea, Epilobium* spp. (excluding *E. Palustre), Holcus lanatus, Juncus effusus, Juncus squarrosus, Ranunculus* spp., *Rumex obtusifolius, Senecio jacobaea, Urtica dioica*

[5]**Tree and Scrub species:** *Betula* spp., *Cytisus scoparius, Hippophae rhamnoides, Pinus* spp., *Prunus spinosa, Quercus* spp., *Rubus* spp.

[6]**Exotics:** *Fallopia japonica, Gaultheria shallon, Rhododendron ponticum*

APPENDIX 4: EXAMPLE OF FIELD CARD

COASTAL MONITORING PROJECT

PROJECT SITE CODE: _____ **SITE NAME:** _____ **COUNTY:** _____

DISCOVERY MAP NO.: _____ **GRID REF.:** _____ **RANGER AREA:** _____

AERIAL PHOTO (2000) :_____

SITE DESIGNATION/S & CODE: N/A_____ NHA_____ SPA_____ SAC_____

MANAGEMENT REGION:_____

RECORDER/S: TIM RYLE ☐ **DATE OF SURVEY:** _____ **SEASON:** _____
KIERAN CONNOLLY ☐ **DATE OF REVISIT(S)** (If applicable)**:**_____
ANNE MURRAY ☐ _____
_____ ☐

MAIN HABITAT: SAND DUNES AND ASSOCIATED SALTMARSHES

General Coastal Habitats

- **Note the presence of target coastal habitats within the study area with a ✓**
- **4 digit code as per EU Habitats Directive. * indicates a Priority Habitat**

Sea cliffs and shingle or stony banks

		1210	Annual vegetation of driftlines
		1220	Perennial vegetation of stony banks

Atlantic and continental salt marshes and salt meadows

		1310	*Salicornia* and other annuals colonizing mud and sand
		1320	*Spartina* swards (Spartinion maritimae)
		1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

Mediterranean and thermo-Atlantic salt marshes and salt meadows

		1410	Mediterranean salt meadows (Juncetalia maritimi)

Sea dunes of the Atlantic, North Sea and Baltic coasts

		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 *	Decalcified Dune Heath
		2170	Dunes with *Salix repens* ssp. *argentea* (Salicion arenariae)
		2190	Humid dune slacks
		21A0 *	Machairs (* in Ireland)

FLORA and FAUNA OF NOTE (Comments from earlier surveys included here. New Information also included on field notes and map)

IMPACTS AND ACTIVITIES

- Intensity of the influence of an activity is rated as: A = high, B = medium and C = low influence.
- Indicate if the influence is positive or negative using the following rating: -2=irreparable negative influence , -1=repairable negative influence, 0= neutral, +1= natural positive influence and +2= strongly managed postive influence.

Code	Category	Intensity			Impact					Habitat	% area of damage
Agriculture, forestry		A	B	C	-2	-1	0	1	2		
100	Cultivation										
101	Modification of cultivation practice										
102	Mowing/Cutting										
103	Agricultural improvement										
110	Use of pesticides										
120	Fertilisation										
130	Irrigation										
140	Grazing										
141	Abandonment of pastoral systems										
142	Overgrazing by sheep										
143	Overgrazing by cattle										
146	Overgrazing by hares, rabbits, small mammals										
147	Overgrazing by geese										
149	Under-grazing										
150	Restructuring agricultural land holding										
152	Removal of scrub										
170	Animal breeding										
171	Stock feeding										
180	Burning										
190	Agricultural activity not referred to above										
Fishing, hunting & collecting											
200	Fish and Shellfish aquaculture										
210	Professional Fishing										
211	Fixed location fishing										
220	Leisure fishing										
221	Bait digging										
240	Taking/Removal of Fauna (General)										
243	Trapping, poisoning, poaching										
244	Other forms of taking fauna										
250	Taking/Removal of Flora (General)										
251	Pillaging of Floristic stations										
290	Hunting, fishing/collecting activities not ref. above										
Mining & extraction of materials											
300	Sand and Gravel extraction										
301	Quarries										
302	Removal of Beach Materials										
310	Peat Extraction										
311	Hand-cutting of peat										
390	Mining and Extraction activities not ref. above										
Urbanisation, industrialisation & similar activities											
400	Urbanised areas, human habitation										
401	Continuous urbanisation										
402	Discontinuous urbanisation										
403	Dispersed habitation										
409	Other patterns of habitation										
410	Industrial or commercial areas										
411	Factory										
412	Industrial stockage										
419	Other industrial/commercial areas										
420	Discharges										
421	Disposal of household waste										
422	Disposal of industrial waste										
423	Disposal of inert materials										
430	Agricultural structures										
440	Storage of materials										
490	Other urbanisation, industrial and similar activities										
Transportation & communication											
500	Communication networks										
501	Paths, tracks, cycling tracks										
502	Routes/autoroutes										
503	Railway lines										
504	Port areas										
505	Airport										
506	Aerodrome/heliport										
507	Bridge, viaduct										
508	Tunnel										
509	Other communication network										
510	Energy transport										
511	Electricity lines										

Code	Category	Intensity			Impact					Habitat	% area of damage
Transportation & communication (cont.)		A	B	C	-2	-1	0	1	2		
512	Pipelines										
513	Other forms of energy transport										
520	Shipping										
530	Improved access to site										
590	Other forms of transportation and communication										
Leisure & tourism											
600	Sports and leisure structures										
601	Golf course										
606	Attraction park										
607	Sports pitch										
608	Camping & caravans										
609	Other sport/leisure complexes										
610	Interpretative centres										
620	Outdoor sports and leisure activities										
621	Nautical sports										
622	Walking, horseriding & non-motorised vehicles										
623	Motorised vehicles										
629	Other outdoor sports & leisure activities										
690	Other leisure & tourism impacts not ref. above										
Pollution & other human impacts/activities											
700	Pollution										
701	Water pollution										
702	Air pollution										
703	Soil pollution										
709	Other forms or mixed forms of pollution										
710	Noise nuisance										
720	Trampling, overuse										
730	Military manoeuvres										
740	Vandalism										
790	Other pollution or human impacts/activities										
Human induced changes in hydraulic conditions (wetland & marine environments)											
800	Landfill, land reclamation & drying out in general										
801	Polderisation										
802	Reclamation of land from sea, estuary or marsh										
803	Infilling of ditches, dykes, ponds, pools, marshes or pits										
810	Drainage										
811	Management of aquatic & bank veg^{n} for drainage purposes										
820	Removal of sediments (muds)										
840	Flooding										
850	Modification of hydrographic functioning, General										
851	Modification of marine currents										
853	Management of water levels										
860	Dumping, depositing of dredged deposits										
870	Dykes, embankments, artificial beaches, General										
871	Sea defence/coastal protection works										
Natural processes (biotic & abiotic)											
890	Other human induced changes in hydraulic conditions										
900	Erosion										
910	Silting up										
920	Drying out										
930	Submersion										
940	Natural catastrophes										
941	Inundation										
943	Collapse of terrain, landslide										
944	Storm, cyclone										
948	Fire (natural)										
949	Other natural catastrophes										
950	Biocoenotic evolution										
951	Accumulation of organic material										
952	Eutrophication										
953	Acidification										
954	Invasion by a species										
960	Interspecific faunal relations										
963	Introduction of disease										
970 *971*	Interspecific floral relations										
	Competition										
975	Lack of pollinating agents										
976	Damage by game species										
979	Other forms or mixed forms of Interspecific floral competition										
990	Other natural processes										

APPENDIX 5

Sites arranged alphabetically per habitat listing conservation status of Annex I habitats and brief explanatory comment

Appendix 5.1 EU Conservation status of Annual vegetation of drift lines (Annex I habitat 1210) in Ireland

CMP Site Name	CMP Site No.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Aillebrack	100	0.604	Galway	Green	Green	Green	Green	All Attributes Favourable (FV)
Askintinny	022	0.262	Wicklow	Green	Green	Green	Green	All Attributes Favourable (FV)
Ballybla	014	0.114	Wicklow	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 due to erosion.
Ballyconeely	099	0.5	Galway	Green	Green	Green	Green	All Attributes Favourable (FV)
Ballymacoda	054	1.397	Wexford	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to erosion.
Ballynaclash	033	0.334	Wexford	Green	Green	Green	Green	All Attributes Favourable (FV)
Baltray	002	3.293	Louth	Green	Green	Green	Green	All Attributes Favourable (FV)
Bartragh Island	131	0.582	Mayo	Green	Green	Green	Green	All Attributes Favourable (FV)
Bunduff	139	2.282	Sligo	Green	Green	Green	Green	All Attributes Favourable (FV)
Cahore Point North	028	0.194	Wexford	Green	Green	Green	Green	All Attributes Favourable (FV)
Carnboy	156	0.14	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 due to natural erosion and trampling.
Castlegregory	075	9.528	Kerry	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to natural erosion which is exacerbated by recreational activities.
Cloghmoyle	110	0.034	Mayo	Green	Green	Green	Green	All Attributes Favourable (FV)
Clooney	149	1.5	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 due to natural erosion and trampling.
Cruit Lower	154	0.12	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 due to erosion as a result of a high degree of trampling.
Crummies Bay	175	0.1	Donegal	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures.
Derrybeg	157	0.05	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 due to erosion as a result of a high degree of trampling.

Cont.,

CMP Site Name	CMP Site No.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Derrymore Island	076	2.053	Kerry	Green	Green	Green	Green	All Attributes Favourable (FV)
Dog's Bay (& Gorteen Bay)	097	0.23	Galway	Amber	Amber	Green	Green	Extent assessed as U1 due to natural erosion.
Donaghmore	027	0.027	Wexford	Green	Green	Green	Green	All Attributes Favourable (FV)
Doolan (Murvey)	098	0.341	Galway	Green	Green	Green	Green	All Attributes Favourable (FV)
Doonloughan	101	0.156	Galway	Green	Green	Green	Green	All Attributes Favourable (FV)
Duncannon	044	0.082	Wexford	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to erosion.
Eararna	091	0.267	Galway	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 as the strandline vegetation is grazed by cattle.
Fahan	174	0.456	Donegal	Green	Green	Green	Green	All Attributes Favourable (FV)
Fanore	087	0.159	Clare	Green	Green	Green	Green	All Attributes Favourable (FV)
Fermoyle (Subsite - Drom Hill)	204	0.161	Kerry	Green	Green	Green	Green	All Attributes Favourable (FV)
Finish Island	094	0.542	Galway	Green	Green	Green	Green	All Attributes Favourable (FV)
Harbour View	057	0.136	Cork	Green	Green	Green	Green	All Attributes Favourable (FV)
Inch	070	1.168	Kerry	Green	Green	Green	Green	All Attributes Favourable (FV)
Inchydoney	058	0.254	Cork	Green	Green	Green	Green	All Attributes Favourable (FV)
Inishbofin	106	0.408	Galway	Green	Green	Green	Green	All Attributes Favourable (FV)
Inishmaan	090	3.596	Galway	Green	Green	Green	Green	All Attributes Favourable (FV)
Inver	144	0.068	Donegal	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to erosion and the negative impacts from intensive agricultural management.
Ireland's Eye	008	0.14	Dublin	Green	Green	Green	Green	All Attributes Favourable (FV)
Keadew	153	0.264	Donegal	Green	Green	Green	Green	All Attributes Favourable (FV)
Kilcoole	013	1.036	Wicklow	Green	Green	Green	Green	All Attributes Favourable (FV)
Kilgorman	024	0.382	Wexford	Green	Green	Green	Green	All Attributes Favourable (FV)
Kilmuckridge	030	0.182	Wexford	Green	Green	Green	Green	All Attributes Favourable (FV)
Kilpatrick	023	0.034	Wexford	Green	Green	Green	Green	All Attributes Favourable (FV)
Kincaslough	155	0.032	Donegal	Amber	Green	Green	Amber	Future Prospects assessed as U1 due to trampling.

Cont.,

CMP Site Name	CMP Site No.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Lahinch	085	0.249	Clare	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to the presence of hard coastal protection.
Laytown	004	0.15	Meath	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures.
Leagaun	103	0.209	Galway	Green	Green	Green	Green	All Attributes Favourable (FV)
Lettermacaward	151	2.518	Donegal	Green	Green	Green	Green	All Attributes Favourable (FV)
Lough Cahasy	109	0.066	Mayo	Green	Green	Green	Green	All Attributes Favourable (FV)
Lurga Point	083	0.889	Clare	Green	Green	Green	Green	All Attributes Favourable (FV)
Magherabeg	016	0.029	Wicklow	Green	Green	Green	Green	All Attributes Favourable (FV)
Magheramore	015	0.037	Wicklow	Green	Green	Green	Green	All Attributes Favourable (FV)
Maheradrumman	172	0.314	Donegal	Green	Green	Green	Green	All Attributes Favourable (FV)
Mason Island	096	0.102	Galway	Green	Green	Green	Green	All Attributes Favourable (FV)
Mount Charles	143	0.012	Donegal	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to damage from vehicle tracks.
Mullansole	142	2.2	Donegal	Green	Green	Green	Green	All Attributes Favourable (FV)
Mweenish Island	095	0.283	Galway	Green	Green	Green	Green	All Attributes Favourable (FV)
North Bull	010	1.298	Dublin	Green	Green	Green	Green	All Attributes Favourable (FV)
Owenahincha & Little Island Strand	061	0.004	Cork	Green	Green	Green	Green	All Attributes Favourable (FV)
Portmarnock	009	0.589	Dublin	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to hard coastal protection and recreational pressures.
Portrane	006	0.935	Dublin	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to natural erosion and recreational pressures.
Roshin Point	150	0.181	Donegal	Green	Green	Green	Green	All Attributes Favourable (FV)
Rosmurrevagh	112	0.079	Mayo	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 due to erosion.
Rossbehy	068	0.081	Kerry	Amber	Amber	Green	Amber	Future Prospects are assessed as U1 due to heavy recreational pressures.

Cont.,

CMP Site Name	CMP Site No.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Shanagarry	055	2.987	Cork	Green	Green	Green	Green	All Attributes Favourable (FV)
St. Helen's	037	0.075	Wexford	Green	Green	Green	Green	All Attributes Favourable (FV)
Strandhill	133	0.987	Sligo	Green	Green	Green	Green	All Attributes Favourable (FV)
The Raven	035	0.369	Wexford	Green	Green	Green	Green	All Attributes Favourable (FV)
Tinnaberna	031	0.004	Wexford	Amber	Amber	Green	Green	Extent is assessed as U1 due to erosion.
Tramore	046	0.437	Waterford	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to recreational pressures.
Tramore (subsite - Bass Point)	095	0.143	Waterford	Green	Green	Green	Green	All Attributes Favourable (FV)
Warren (Creggane)	062	0.086	Cork	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to recreational pressures.
Waterville	067	0.366	Kerry	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to hard coastal protection and recreational pressures.
White Strand	180	0.011	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 as a result of high levels of erosion due to exposed coastline.

Appendix 5.2 EU Conservation status of Perennial vegetation of stony banks (Annex I habitat 1220) in Ireland

CMP Site Name	CMP Site No.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Augrusbeg	105	0.065	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Ballybla	014	1.252	Wicklow	Amber	Amber	Green	Amber	Extent and Future Prospects rated as U1 due to natural erosion.
Ballyconeely	099	0.338	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Ballymacoda	054	1.178	Cork	Amber	Green	Green	Amber	Future Prospect assessed as U1 due to erosion.
Ballyteige Burrow	041	0.506	Wexford	Green	Green	Green	Green	All attributes favourable (FV)
Barley Cove (Subsite - West of Whitestrand)	210	0.842	Cork	Green	Green	Green	Green	All attributes favourable (FV)
Barley Cove (Subsite - Whitestrand)	209	0.12	Cork	Green	Green	Green	Green	All attributes favourable (FV)
Barna (Whitestrand)	093	1.087	Mayo	Green	Green	Green	Green	All attributes favourable (FV)
Bartraw	111	0.48	Mayo	Green	Green	Green	Green	All attributes favourable (FV)
Bishopsquarter	088	0.179	Clare	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational activities and trampling.
Carnsore	039	1.206	Wexford	Green	Green	Green	Green	All attributes favourable (FV)
Cloghmoyle	110	0.082	Mayo	Green	Green	Green	Green	All attributes favourable (FV)
Clooney	149	0.07	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Corraun Point	115	0.017	Mayo	Amber	Green	Green	Amber	Future Prospects assessed as U1 due to trampling by cattle.
Derrymore Island	076	2.784	Kerry	Amber	Green	Amber	Green	Structure and Functions are assessed as U1 due to an excessive cover of negative indicator species.
Doagh Isle	178	1.206	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to natural erosion which is exacerbated by recreational activities.
Dog's Bay (& Gorteen Bay)	097	0.161	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Donaghmore	027	0.052	Wexford	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to recreational pressures and erosion.
Dooey	160	0.37	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Eararna	091	0.416	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Fanore	087	0.525	Clare	Green	Green	Green	Green	All attributes favourable (FV)
Finner (Subsite - Ballymacaward)	211	0.352	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Gola Island	158	0.022	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Inver	144	0.257	Donegal	Amber	Green	Amber	Amber	Structure and Functions are assessed as U1 due to an excessive cover of negative indicator species. Future Prospects are assessed as U1 due to recreational pressures.
Ireland's Eye	008	0.129	Dublin	Green	Green	Green	Green	All attributes favourable (FV)

Cont.,

CMP Site Name	CMP Site No.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Kilcoole	013	2.678	Wicklow	Green	Green	Green	Green	All attributes favourable (FV)
Killiney	012	0.878	Dublin	Green	Green	Green	Green	All attributes favourable (FV)
Lahinch	085	0.138	Clare	Green	Green	Green	Green	All attributes favourable (FV)
Laytown	004	0.175	Meath	Amber	Amber	Green	Amber	Extent and Structure and Functions are assessed as U1 due to recreational pressures.
Lurga Point	083	0.216	Clare	Amber	Green	Amber	Amber	Structure and Functions and Future prospects are assessed as U1 due to recreational pressures and the intensive agricultural management of adjacent habitat.
Maghera (Subsite)	202	0.1	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Maheradrumman	172	0.297	Donegal	Amber	Amber	Amber	Amber	All parameters are rated as U1 due to natural erosion compounded by recreational activities, most notably quad biking.
Mount Charles	143	0.108	Donegal	Red	Green	Amber	Red	Structure and Functions are assessed as U1 due to an excessive cover of negative indicator species. Future prospects are assessed as U2 due to large scale disturbance from construction works.
Mullansole	142	0.64	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Mweenish Island	095	0.331	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Omey Island	104	0.155	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Roshin Point	150	0.259	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Rosmurrevagh	112	0.01	Mayo	Amber	Amber	Green	Amber	Extent and Future prospects are assessed as U1 due to erosion and recreational pressures.
Rossnowlagh	141	1	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Shanagarry	055	1.175	Cork	Amber	Amber	Green	Amber	Extent and Structure and Functions are assessed as U1 due to the presence of hard coastal protection and recreational pressures.
Strandhill	133	1.533	Sligo	Amber	Green	Green	Amber	Future prospects are assessed as U1 due to intense recreational pressures.
Termoncarragh Lough	127	0.424	Mayo	Amber	Green	Green	Amber	Future prospects are assessed as U1 due to removal of beach materials and disturbance from agricultural activities.
Tinnaberna	031	0.004	Wexford	Amber	Amber	Green	Green	Extent assessed as U1 due to limited area of habitat.
Tramore	046	0.211	Waterford	Amber	Green	Green	Amber	Future prospects are assessed as U1 due to intense recreational pressures.
Waterville	067	0.322	Kerry	Amber	Green	Green	Amber	Extent is rated as U1 due to natural erosion and recreational pressures.
White Strand	180	2.14	Donegal	Amber	Amber	Amber	Amber	All attributes Assessed as U1 due to shingle extraction.
Whiting Bay	052	0.123	Waterford	Amber	Amber	Green	Amber	Extent and Future prospects are assessed as U1 due to erosion and recreational pressures.

Appendix 5.3 EU Conservation status of Embryonic Dunes (Annex I habitat 2110) in Ireland

CMP Site name	CMP Site code	Area (ha)	County	Overall	Extent	Structure and function	Future prospects	Comment
Agleam	124	1.476	Mayo	Green	Green	Green	Green	All attributes favourable (FV)
Aillebrack	100	0.559	Galway	Red	Red	Green	Red	Extent and Future Prospects are assessed as U2 due to erosion, and the limited extent and poor zonation of habitat.
Ardamine	26	0.06	Wexford	Red	Red	Green	Amber	Extent rated U2 owing to destruction of the habitat through erosion. Future prospects rated U1due potential re-establishment of habitat.
Ards	165	0.108	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to the limited distribution and zonation of habitat, an excessive cover of unhealthy vegetation, and recreational pressures.
Arklow North	20	0.429	Wicklow	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures.
Arklow South	21	0.09	Wicklow	Red	Green	Green	Red	Future Prospects are assessed as U2 due to heavy recreational pressures.
Askintinny	22	0.103	Wicklow	Red	Red	Green	Red	Extent and Future Prospects are assessed as U2 due to erosion, and the limited extent and poor zonation of habitat.
Augrusbeg	105	0.243	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Ballybla	14	0.059	Dublin	Amber	Amber	Green	Amber	Extent and Future Prospects rated U1 due to scarcity of habitat and ongoing erosion.
Ballydavid	73	0.222	Kerry	Red	Red	Green	Amber	All attributes U2 due to limited extent, and continued disturbance of habitat from erosion and recreational developments.
Ballymacoda	54	0.817	Wexford	Red	Red	Red	Amber	Extent and Structure and Function rated U2 due to limited extent caused by erosion and presence of negative indicator species.
Ballymastocker	173	0.964	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 as a result of natural erosion and anthropogenic activities.
Ballynaclash	33	1.278	Wexford	Amber	Amber	Green	Amber	Structure and Functions/Future Prospects are assessed as U1 due to recreational pressures.
Ballyness	161	2.3	Donegal	Green	Green	Green	green	All attributes favourable (FV)
Baltray	2	2.617	Louth	Amber	Green	Amber	Amber	Structure and Functions/Future Prospects are assessed as U1 due to recreational pressures.
Banna Strand	77	2.243	Kerry	Amber	Amber	Green	Green	Extent rated as U1 due to restricted distribution of habitat.
Bartragh Island	131	0.749	Mayo	Green	Green	Green	Green	All attributes favourable (FV)
Beal Point	80	1.26	Kerry	Amber	Amber	Green	Green	Extent is assessed as U1 due to erosion caused by sand and gravel extraction.
Bishopsquarter	88	0.033	Clare	Amber	Amber	Green	Amber	Extent is assessed as U1 due to the limited area and poor zonation of habitat. Future Prospects are assessed as U1 due to recreational pressures and intensive agricultural management.

Cont.

CMP Site name	CMP Site code	Area (ha)	County	Overall	Extent	Structure and function	Future prospects	Comment
Brittas Bay	17	0.647	Wicklow	Amber	Amber	Amber	Amber	Rated U1 due to scarcity of habitat and recreational impacts and erosion.
Cahore Point North	28	4.713	Wexford	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures.
Cahore Point South	29	0.059	Wexford	Red	Red	Green	Red	Extent is assessed as U2 due to the very limited area and poor zonation of habitat. Future Prospects are assessed as U2 due to intense recreational pressures.
Carnboy	156	1.4	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Carnsore	39	4.265	Wexford	Green	Green	Green	Green	All attributes favourable (FV)
Cloghmoyle	110	0.03	Mayo	Amber	Amber	Green	Green	Extent rated U1 due to lack of habitat due to erosion.
Clooney	149	3	Donegal	Amber	Green	Green	Amber	Future Prospects assessed as U1 due to trampling by horses and recreational pressure.
Cruit Lower	154	1.3	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Crummies Bay	175	0.095	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to the limited area and poor zonation of habitat.
Culdaff	181	0.086	Donegal	Red	Red	Red	Amber	Extent is assessed as U2 due to the very limited area of habitat. Structure and functions are assessed as U2 due to an excess of unhealthy *Elytrigia juncea* (Sand couch). Future Prospects are assessed as U1 due to recreational pressures.
Curracloe	34	0.845	Wexford	Red	Amber	Red	Amber	Structure and Functions is assessed as U2 due to recreational pressures.
Derrybeg	157	1.4	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Derrynane	66	1.007	Cork	Green	Green	Green	Green	All attributes favourable (FV)
Dog's Bay (& Gorteen Bay)	97	0.53	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Donaghmore	27	0.217	Wexford	Red	Red	Green	Red	Extent is assessed as U2 due to the very limited area, and poor zonation of habitat. Future Prospects are assessed as U2 due to erosion and recreational pressures.
Dooey	160	4.8	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Doonloughan	101	0.615	Galway	Red	Red	Green	Red	Extent and Future Prospects are assessed as U2 due to erosion and sediment depletion in the system.
Duncannon	44	0.243	Wexford	Amber	Green	Green	Amber	Future Prospects rated U1 owing to disturbance of recreational users
Dunfanaghy	163	1.2	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 due to high recreational pressure.
Fahan	174	1.506	Donegal	Amber	Green	Amber	Green	Structure and functions rated U1 owing to presence of negative indicator species associated with large volumes of pedestrian traffic.

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CMP Site name	CMP Site code	Area (ha)	County	Overall	Extent	Structure and function	Future prospects	Comment
Fanore	87	0.283	Clare	Red	Red	Green	Red	Extent is assessed as U2 due to the limited area and poor zonation of habitat. Future Prospects are assessed as U2 due to erosion and sediment depletion in the system.
Fermoyle	74	0.173	Kerry	Amber	Amber	Amber	Amber	All attributes U1 due to limited occurrence and highly disturbed nature of the habitat.
Finish Island	94	0.143	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Finner	140	10.786	Sligo	Green	Green	Green	Green	All attributes favourable (FV)
Fintragh	145	1.219	Donegal	Amber	Amber	Amber	Amber	All parameters are rated as U1 due to hard coastal protection.
Glen Bay	146	0.126	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U2 due to erosion, and the limited area of habitat.
Gowlaun	107	0.223	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Grange	43	1.439	Wexford	Amber	Green	Green	Amber	Future Prospects rated U1 owing to net erosion at the site.
Harbour View	57	0.648	Cork	Green	Green	Green	Green	All attributes favourable (FV)
Inch	70	14.405	Kerry	Green	Green	Green	Green	All attributes favourable (FV)
Inchydoney	58	0.051	Cork	Red	Red	Amber	Red	Extent is assessed as U2 due to the negligible area and poor zonation of habitat. Structure and functions are assessed as U1 due to presence of much unhealthy vegetation. Future Prospects are assessed as U2 due to heavy recreational pressures.
Inishbofin	106	0.468	Galway	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to erosion, recreational pressures, and the restricted area of habitat.
Inisheer	89	0.257	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Inishmaan	90	1.563	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Inver	144	0.295	Donegal	Red	Amber	Red	Red	Structure and functions are assessed as U2 due to the common occurrence of negative indicator species. Future Prospects are assessed as U2 due to erosion and the intensive agricultural use of the site.
Ireland's Eye	8	0.158	Dublin	Amber	Amber	Green	Amber	Structure and Functions/Future Prospects are assessed as U1 due to natural erosion compounded by recreational pressures.
Keadew	153	0.466	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Kilgorman	24	0.71	Wexford	Red	Amber	Green	Red	Extent is assessed as U1 due to the limited area and restricted zonation of habitat. Future Prospects are assessed as U2 due to recreational pressures and the spread of scrub species throughout the system.
Killiney	12	0.189	Dublin	Red	Red	Amber	Amber	Extent rated U2, while structure and functions and Future prospects U1 due to highly disturbed nature of vegetation.
Kilmuckridge	30	0.668	Wexford	Green	Green	Green	Green	All attributes favourable (FV)

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CMP Site name	CMP Site code	Area (ha)	County	Overall	Extent	Structure and function	Future prospects	Comment
Kilpatrick	23	0.22	Wicklow	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to the limited area and poor zonation of habitat, erosion and recreational pressures.
Kincaslough	155	0.056	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects rated as U1 due to natural erosion and sand extraction.
Lackan (Subsite)	201	0.066	Sligo	Red	Red	Green	Amber	Extent is assessed as U2 due to the limited area and poor zonation of habitat. Future Prospects are assessed as U1 due to erosion, and intensive agricultural management of the site.
Laytown	4	0.891	Meath	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to recreational pressures.
Leam Lough	125	0.217	Mayo	Red	Red	Green	Amber	Extent is assessed as U2, and Future Prospects assessed as U1 due to the very limited extent and poor zonation of habitat, and sediment depletion in the system.
Lettermacaward	151	1.962	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects rated as U1 due to natural erosion and recreational activities.
Lough Cahasy	109	1.034	Mayo	Green	Green	Green	Green	All attributes favourable (FV)
Lough Nagreany	169	0.766	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects rated as U1 due to on-going sand extraction.
Lurga Point	83	0.712	Clare	Red	Red	Red	Red	All attributes are assessed as U2 due to the very limited area of habitat, erosion, intensive agricultural management, recreational pressures and trampling.
Maghera (Subsite)	202	0.4	Mayo	Green	Green	Green	Green	All attributes favourable (FV)
Magherabeg	16	1.655	Wicklow	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures.
Malahide Island	7	0.27	Dublin	Amber	Amber	Green	Amber	Structure and Functions/Future Prospects are assessed as U1 due to natural erosion compounded by recreational pressures.
Mannin Bay	102	1.331	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Marble Hill	164	0.299	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects rated as U1 due to natural erosion and recreational activities.
Mason Island	96	0.173	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Melmore	168	0.098	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Mizen Head	18	0.966	Wicklow	Green	Green	Green	Green	All attributes favourable (FV)
Mornington	3	0.665	Meath	Amber	Amber	Amber	Amber	All parameters are assessed as A1 due to recreational pressures.
Mount Charles	143	0.411	Donegal	Amber	Green	Amber	amber	Structure and Functions are assessed as U1 due to the common occurrence of negative indicator species. Future Prospects are assessed as U1 due to the intensive agricultural management of the site.

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CMP Site name	CMP Site code	Area (ha)	County	Overall	Extent	Structure and function	Future prospects	Comment
Mullanasole	142	3.935	Donegal	Amber	Amber	Green	Amber	Structure and Functions are assessed as U1 due to the presence of hard coastal protection.
Mweenish Island	95	0.115	Galway	Amber	Amber	Green	Amber	Extent and Future prospects rated U1owing to erosion and sediment depletion.
North Bull	10	2.479	Dublin	Amber	Amber	Green	Amber	Extent and Future prospects are assessed as U1 due to erosion and recreational pressures.
Omey Island	104	0.569	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Owenahincha & Little Island Strand	61	0.591	Cork	Amber	Green	Green	Amber	Future prospects are assessed as U1 due to heavy recreational pressures.
Pennycomequick	19	0.354	Wicklow	Green	Green	Green	Green	All attributes favourable (FV)
Portmarnock	9	1.552	Dublin	Amber	Amber	Green	Amber	Structure and Functions/Future Prospects are assessed as U1 due to human induced erosion caused by estuarine reclamation and compounded by recreational pressures.
Portmurvy	92	0.121	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Portrane	6	1.672	Dublin	Red	Amber	Green	Red	Future Prospects are assessed U2 due to the recreational pressures and hard coastal protection on the site.
Rosapenna	166	3.081	Donegal	Amber	Amber	Green	Amber	Extent and Future prospects are assessed as U1 due to erosion and recreational pressures.
Roshin Point	150	0.374	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Rosmurrevagh	112	1.38	Mayo	Green	Green	Green	Green	All attributes favourable (FV)
Ross	130	0.662	Mayo	Amber	Amber	Green	Amber	Extent and Future prospects are assessed as U1 due to erosion and probable sediment depletion.
Ross (Subsite)	200	0.145	Mayo	Red	Red	Green	Amber	Extent is assessed as U2 due to the very limited extent of habitat. Future prospects are assessed as U1 due to erosion and the intensive agricultural management of the site.
Rossbehy	68	0.792	Kerry	Red	Red	Green	Amber	Extent is assessed as U2 due to erosion compounded by recreational pressures. Future prospects are assessed as U1 due to recreational pressures.
Rosses Point	135	32.274	Sligo	Amber	Amber	Green	Amber	Extent/Future Prospects are assessed as U1 due to recreational pressures.
Rosslare	36	1.058	Wexford	Red	Red	Red	Red	All parameters are assessed as U2 as most of the site is managed to protect the properties and infrastructure backing the beach.
Rossnowlagh	141	0.2	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects rated as U1 due high recreation and beach cleaning.
Rush Sandhills	5	1.169	Dublin	Amber	Amber	Green	Amber	Structure and Functions/Future Prospects are assessed as U1 due to recreational pressures.

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CMP Site name	CMP Site code	Area (ha)	County	Overall	Extent	Structure and function	Future prospects	Comment
Shanagarry	55	1.473	Cork	Green	Green	Green	Green	All attributes favourable (FV)
Sheskinmore	148	8.485	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
South Bull	11	0.448	Dublin	Amber	Green	Green	Amber	Future prospects are assessed as U1 due to erosion and recreational pressures.
Srah North	122	0.461	Mayo	Amber	Amber	Green	Amber	Extent and Future prospects are assessed as U1 due to erosion and recreational pressures.
St. Helen's	37	0.427	Wexford	Red	Amber	Amber	Red	Extent is assessed as U1 and Future prospects assessed as U2 due to erosion and recreational pressures. Structure and Functions are assessed as U1 due to the presence of unhealthy vegetation.
St. Margaret's	38	1.164	Wexford	Red	Red	Amber	Red	Extent and Future prospects are assessed as U2 due to erosion and severe recreational pressures. Structure and Functions are assessed as U1 due to the presence of unhealthy vegetation.
Strandhill	133	0.943	Sligo	Green	Green	Green	Green	All attributes favourable (FV)
Streedagh Point	137	0.424	Sligo	Red	Red	Green	Red	Extent and Future prospects are assessed as U2 due to the limited area and restricted zonation of habitat, erosion and recreational pressures.
Termoncarragh Lough	127	1.305	Mayo	Amber	Amber	Green	Amber	Extent and Future prospects are assessed as U1 due to the limited area and poor zonation of habitat, and sediment depletion in the system.
The Raven	35	1.087	Wexford	Red	Red	Amber	Amber	Extent is assessed as U2 due to the very limited area of habitat. Structure and Functions are assessed as U1 due to the presence of unhealthy vegetation. Future prospects are assessed as U1 due to recreational pressures.
Tinnaberna	31	0.009	Wexford	Amber	Amber	Green	Green	Extent rated as U1 owing to paucity of habitat.
Tramore	46	4.036	Wexford	Amber	Green	Green	Amber	Future prospects are assessed as U1 due to recreational pressures.
Tramore (Subsite)	246	0.266	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Tullagh	177	0.22	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Warren (Creggane)	62	0.423	Cork	Green	Green	Green	Green	All attributes favourable (FV)
Waterville	67	0.547	Kerry	Amber	Green	Green	Amber	Future prospects are assessed as U1 due to ongoing recreational threats.
White Strand	81	0.187	Clare	Green	Green	Green	Green	All attributes favourable (FV)
White Strand	180	0.019	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects rated as U1 high natural erosion.
Yellow Strand	136	0.837	Sligo	Amber	Green	Amber	Green	Structure and Functions is rated as U1 due to natural erosion compounded by human activities.

Appendix 5.4 EU Conservation status of Shifting Dunes along the shoreline with *Ammophila arenaria* (Annex I habitat 2120) in Ireland

CMP Site Name	CMP Site Code	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Aghleam	124	5.126	Mayo	Green	Green	Green	Green	All Attributes favourable (FV)
Aillebrack	100	0.184	Galway	Red	Red	Green	Red	Extent and Future Prospects are assessed as U2 due to erosion and sand extraction.
Ardamine	026	0.002	Wexford	Red	Red	Green	Amber	Extent rated U2 due to recent natural destruction of habitat. Future Prospects rated U1 owing to gradual re-accumulation of sediment.
Ards	165	0.479	Donegal	Amber	Amber	Amber	Amber	Extent and Future Prospects are assessed as U1 due to erosion and recreational pressures. Structure and Functions are assessed as U1 due to the prevalence of unhealthy *Ammophila arenaria* (Marram).
Arklow North	020	0.216	Wicklow	Red	Green	Red	Amber	Structure and Functions are assessed as U2 due to trampling and other disturbance caused by recreational pressures. Future Prospects are assessed as U1 due to heavy recreational pressures.
Arklow South	021	0.096	Wicklow	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures and the proximity of construction works.
Ballybunion	079	1.615	Kerry	Red	Red	Amber	Red	Extent is assessed as U2 due to the installation of coastal protection by golf course.
Ballyconeely	099	0.152	Galway	Amber	Amber	Green	Green	Extent rated as U1 owing to limited occurrence of habitat.
Ballydavid	073	0.434	Kerry	Red	Red	Green	Amber	Extent rated as U2, Future Prospects rated as U1 due to agricultural disturbance.
Ballyheige	078	0.616	Kerry	Red	Red	Red	Red	Extent, Structure and Functions and Future Prospects are assessed as U2 due to the limited area and poor zonation of habitat, the prevalence of unhealthy *Ammophila arenaria* (Marram), and recreational pressures.
Ballymastocker	173	2.372	Donegal	Green	Green	Green	Green	All Attributes favourable (FV)
Ballynaclash	033	1.867	Wexford	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as A1 due to recreational pressures.
Ballyness	161	14.15	Donegal	Green	Green	Green	Green	All Attributes favourable (FV)
Ballyteige Burrow	041	6.236	Wexford	Green	Green	Green	Green	All Attributes favourable (FV)
Baltray	002	4.371	Louth	Amber	Green	Amber	Amber	Structure and Functions/Future Prospects are assessed as A1 due to recreational pressures.
Banna Strand	077	6.787	Kerry	Red	Amber	Red	Amber	Structure and Functions rated as U2 owing to widespread presence of negative indicator species. Extent and Future prospects rated as U1.

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CMP Site Name	CMP Site Code	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Bannow Island	042	0.105	Wexford	Amber	Amber	Green	Amber	Extent and Future Prospects rated as U1 owing to natural erosion and recreational pressures.
Barley Cove	064	0.150	Cork	Red	Red	Green	Red	Extent and Future Prospects rated as U1 owing to natural erosion and recreational pressures.
Barley Cove (Subsite - Golf course)	208	0.446	Cork	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 due to limited distribution and lack of sediment input into system coupled with recreational impacts.
Bartragh Island	131	7.519	Mayo	Green	Green	Green	Green	All Attributes favourable (FV)
Bartraw	111	0.184	Mayo	Red	Red	Green	Amber	Extent rated as U2, owing to limited distribution of habitat.
Beal Point	080	0.514	Kerry	Amber	Amber	Green	Green	Extent is assessed as U1, as the limited extent and poor zonation of habitat are partly attributed to sand and gravel extraction.
Bishopsquarter	088	0.143	Clare	Amber	Amber	Green	Amber	Extent is assessed as U1 due to the scarcity and poor zonation of habitat and recreational use. Future Prospects are assessed as U1 due to intensive stock rearing practices and recreational activities.
Brittas Bay	017	3.316	Wicklow	Amber	Green	Amber	Amber	Extent rated as FV. However Structure and Functions and Future prospects rated U1 due to ongoing natural erosion and recreational pressure.
Bunduff	139	5.1	Sligo	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects rated as U1 due to natural erosion exacerbated by recreational pressure and grazing by cattle.
Bunmahon	047	0.668	Waterford	Red	Green	Amber	Red	Future Prospects rated as U2 owing to recreational pressures and dune protection works. Extent and Structure and Functions rated U1.
Cahore Point North	028	24.212	Wexford	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures.
Cahore Point South	029	1.005	Wexford	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures.
Carnboy	156	2.4	Donegal	Amber	Amber	Amber	Green	Extent and Structure and Functions rated as U1 due to previous natural erosion.
Carnsore	039	2.521	Wexford	Amber	Green	Green	Amber	Future Prospects rated U1 owing to erosion and impacts of recreational users.
Castlefreke	060	1.785	Cork	Amber	Amber	Green	Green	Extent is assessed as UI due to the invasion of *Pteridium aquilinum.*
Castlegregory	075	9.419	Kerry	Red	Amber	Green	Red	Future prospects are assessed as U1 due to the ongoing threat of natural erosion compounded by human activities.
Cloghmoyle	110	0.615	Mayo	Green	Green	Green	Green	All Attributes favourable (FV)

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CMP Site Name	CMP Site Code	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Clooney	149	3.5	Donegal	Red	Amber	Red	Amber	Structure and functions rated as U2 due to trampling from high recreational pressure.
Coney Island	134	0.455	Sligo	Amber	Green	Green	Amber	Future prospects are assessed as U1 due to the ongoing threat of natural erosion compounded by rabbit and human activities.
Courtown	025	0.105	Wexford	Red	Red	Amber	Red	Extent and Future Prospects rated U2 due to natural destruction of habitat. Structure and functions rated U1 in remaining patches of habitat.
Cross Lough	126	2.606	Mayo	Amber	Amber	Green	Amber	Extent/Future Prospects are assessed as U1 due the development of an equestrian centre.
Cruit Lower	154	2	Donegal	Red	Amber	Red	Amber	Structure and Functions are assessed as U2 due to an excessive cover of unhealthy *Ammophila arenaria* (Marram) due to trampling – high recreational pressure.
Crummies Bay	175	0.458	Donegal	Red	Green	Red	Amber	Structure and Functions are assessed as U2 due to an excessive cover of unhealthy *Ammophila arenaria* (Marram). Future prospects are assessed as U1 due to erosion and sediment depletion.
Culdaff	181	1.033	Donegal	Red	Green	Red	Amber	Structure and Functions are assessed as U2 due to an excessive cover of unhealthy *Ammophila arenaria* (Marram). Future prospects are assessed as U1 due to high recreational pressures.
Curracloe	034	3.141	Wexford	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to the invasion of *Pteridium aquilinum* and erosion induced by recreational activities.
Derrybeg	157	5	Donegal	Red	Green	Red	Amber	Structure and functions rated as U2 due to presence of rock armour and trampling due to high recreational pressure.
Derrymore Island	076	2.537	Kerry	Red	Green	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to an excessive cover of unhealthy *Ammophila arenaria* (Marram), and probable sediment depletion.
Derrynane	066	1.667	Kerry	Green	Green	Green	Green	All Attributes favourable (FV)
Doagh Isle	178	0.771	Donegal	Green	Green	Green	Green	All Attributes favourable (FV)
Doaghmore	170	0.832	Donegal	Amber	Green	Green	Amber	Extent is assessed as U1 due to on-going sand extraction.
Dog's Bay (& Gorteen Bay)	097	0.5	Galway	Amber	Amber	Amber	Green	Extent and Structure and Functions rated as U1 due to previous natural erosion and presence of rock armour.
Donaghmore	027	0.138	Wexford	Red	Red	Amber	Red	Extent and Future Prospects are assessed as U2 due to the very limited area and poor zonation of habitat. Structure and Functions are assessed as U1 due to the presence of unhealthy *Ammophila arenaria* (Marram).

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CMP Site Name	CMP Site Code	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Doo Lough	120	4.604	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to erosion and sediment depletion.
Dooaghtry	108	18.709	Mayo	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to damage from rabbit burrowing, trampling by grazers and visitors to the site.
Dooey	160	11.505	Donegal	Green	Green	Green	Green	All Attributes favourable (FV)
Dooyork	119	0.140	Mayo	Red	Red	Red	Red	Extent and Future Prospects are assessed as U2 due to the limited area and poor zonation of habitat. Structure and Functions are assessed as U2 due to an excessive cover of unhealthy *Ammophila arenaria* (Marram).
Duncannon	044	0.582	Wexford	Green	Green	Green	Green	All Attributes favourable (FV)
Dunfanaghy	163	2.2	Donegal	Amber	Amber	Amber	Amber	All attributes rated as U1 due to natural erosion compounded by trampling, high cover of unhealthy *Ammophila arenaria* (Marram) due to trampling.
Eararna	091	1.646	Galway	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to amenity and leisure activities, especially scrambling and trampling.
Fahan	174	1.160	Donegal	Amber	Amber	Green	Green	Extent rated as U1, owing to scarcity of habitat.
Fanore	087	0.379	Clare	Red	Red	Red	Red	Extent, Structure and Functions, and Future Prospects are assessed as U2 due to the very limited extent and poor zonation of habitat, an excessive cover of unhealthy *Ammophila arenaria* (Marram), and sediment depletion.
Fermoyle	074	2.102	Kerry	Amber	Amber	Green	Amber	Extent and Future Prospects rated U1 due to erosion and agricultural degradation of the habitat.
Fermoyle (Subsite - Drom Hill)	204	1.153	Kerry	Green	Green	Green	Green	All Attributes favourable (FV)
Finner	140	7.004	Donegal	Green	Green	Green	Green	All Attributes favourable (FV)
Fintragh	145	0.742	Donegal	Red	Red	Red	Red	All parameters are assessed as U2 due to recreational activities and the installation of coastal protection.
Garter Hill	128	13.379	Mayo	Green	Green	Green	Green	All Attributes favourable (FV)
Glen Bay	146	0.939	Donegal	Red	Amber	Red	Amber	Extent and Future Prospects are assessed as U1 due to erosion and recreational pressures. Structure and Functions are assessed as U2 due to an excessive cover of unhealthy *Ammophila arenaria* (Marram), and the sparseness of vegetation throughout the habitat.
Gola Island	158	0.541	Donegal	Green	Green	Green	Green	All Attributes favourable (FV)
Gortnatraw	171	0.257	Donegal	Red	Amber	Red	Amber	Extent and Future Prospects are assessed as U1 due to erosion, and the limited area and poor zonation of habitat. Structure and Functions are assessed as U2 due to an excessive cover of unhealthy *Ammophila arenaria* (Marram).

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CMP Site Name	CMP Site Code	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Gowlaun	107	1.650	Galway	Amber	Green	Amber	Green	Structure and Functions rated as U1 largely due to presence of negative indicators species.
Grange	043	0.649	Wexford	Red	Red	Amber	Amber	Extent rated as U2 due to limited occurrence due to erosion. Structure and Functions and Future Prospects rated U1 owing to impacts from recreational traffic.
Harbour View	057	0.413	Cork	Green	Green	Green	Green	All Attributes favourable (FV)
Inch	070	25.798	Kerry	Green	Green	Green	Green	All Attributes favourable (FV)
Inchydoney	058	0.420	Cork	Red	Red	Amber	Amber	Extent is assessed as U2 due to the very limited area and poor zonation of habitat. Structure and Functions, and Future Prospects are assessed as U1 due to the trampling and associated damage caused by recreational activities.
Inishbofin	106	0.038	Galway	Red	Red	Green	Amber	Extent is assessed as U2 due to the very limited area and poor distribution of habitat. Future Prospects are assessed as U1 due to erosion and recreational pressures.
Inishcrone	132	3.65	Sligo	Red	Amber	Red	Amber	Structure and Functions rated as U2 due to high cover of dead or dying *Ammophila arenaria* (Marram).
Inisheer	089	0.193	Galway	Amber	Amber	Green	Green	Extent rated as U1 owing to lack of habitat.
Inishmaan	090	1.611	Galway	Green	Green	Green	Green	All Attributes favourable (FV)
Ireland's Eye	008	0.299	Dublin	Red	Amber	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to recreational activities and tourist pressures.
Keadew	153	0.732	Donegal	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to recreational activities.
Keel Lough	113	1.8	Mayo	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects rated as U1 as very little natural development, only man-made dunes present, little possibility of future development as large shingle ridge to seaward side.
Kilgorman	024	0.499	Wexford	Red	Amber	Green	Red	Extent is assessed as U1 due to the limited area of habitat. Future Prospects are assessed as U2 due to recreational pressures, and scrub encroachment through the entire system.
Killiney	012	0.068	Dublin	Red	Red	Amber	Red	Extent and Future Prospects rated U2 due to limited occurrence of habitat. Structure and Function rated U1 due to occurrence of negative indicator species.
Kilmuckridge	030	2.881	Wexford	Green	Green	Green	Green	All Attributes favourable (FV)
Kilpatrick	023	0.362	Wexford	Amber	Amber	Green	Amber	Extent is assessed as U1 due to erosion and the limited very area of habitat. Future Prospects are assessed as U1 due to erosion, the presence of negative indicator species, and recreational activities.

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CMP Site Name	CMP Site Code	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Kincaslough	155	0.815	Donegal	Red	Amber	Red	Amber	Structure and functions assessed as U2 as a result of severe natural erosion and high cover of dead or dying *Ammophila arenaria* (Marram).
Kinrovar	118	0.951	Mayo	Red	Red	Green	Amber	Extent is assessed as U2 due to the limited area and poor distribution of habitat, erosion and sediment depletion. Future Prospects are assessed as U1 due to sediment depletion and erosion.
Lackan	129	2.543	Mayo	Red	Red	Red	Red	Extent, Structure and Functions, and Future Prospects are assessed as U2 due to poor habitat zonation and extent, erosion, and an excessive cover of unhealthy *Ammophila arenaria* (Marram) in the habitat.
Lackan (Subsite)	201	0.283	Mayo	Amber	Amber	Green	Amber	Extent is assessed as U1 due to the limited area and restricted zonation of habitat. Future Prospects are assessed as U1 due to sediment depletion and erosion.
Lag	179	2.017	Donegal	Amber	Amber	Amber	Amber	Extent is assessed as U1 due to erosion and poor zonation. Structure and Functions are assessed as U1 due to the presence of negative indicator species. Future Prospects are assessed as U1 due to erosion and recreational pressures.
Laytown	004	1.335	Meath	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to human-induced erosion and recreational activities.
Leagaun	103	0.145	Galway	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to recreational activities associated with the caravan park.
Leam Lough	125	2.362	Mayo	Red	Red	Amber	Amber	Extent is assessed as U2 due to the limited area and poor zonation of habitat. Structure and Functions are assessed as U1 due to an excessive cover of unhealthy *Ammophila arenaria* (Marram). Future Prospects are assessed as U1 due to sediment depletion and erosion.
Lenankeel	176	0.36	Donegal	Red	Amber	Red	Amber	Structure and Functions assessed as U2 due to natural erosion and presence of rock armour
Lettermacaward	151	7.349	Donegal	Green	Green	Green	Green	All Attributes favourable (FV)
Lough Cahasy	109	0.898	Mayo	Green	Green	Green	Green	All Attributes favourable (FV)
Lough Doo	114	1.07	Mayo	Red	Amber	Red	Amber	Structure and Functions assessed as U2 due to high cover of unhealthy *Ammophila arenaria* (Marram).
Lough Nagreany	169	1.407	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to on-going sand extraction
Lunniagh	159	3.684	Donegal	Red	Amber	Red	Amber	Extent is assessed as U1 due to poor zonation. Structure and Functions are assessed as U2, and Future prospects are assessed as U1 due to trampling and vehicular damage.

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CMP Site Name	CMP Site Code	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Lurga Point	083	0.047	Clare	Red	Red	Green	Red	Extent is assessed as U2 due to limited area and poor zonation. Future Prospects are assessed as U2 due to unsustainable agricultural management practices and the lack of statutory protection for the site.
Maghera	147	6.9	Donegal	Amber	Green	Amber	Green	Structure and Functions assessed as U2 due to high cover of unhealthy *Ammophila arenaria* (Marram) in some areas.
Maghera (Subsite)	202	0.5	Donegal	Red	Green	Red	Green	Structure and Functions rated as U2 due to high cover of dead or dying *Ammophila arenaria* (Marram) and high cover of agricultural weeds.
Magherabeg	016	1.841	Wicklow	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to erosion and recreational pressures.
Maheradrumman	172	2.014	Donegal	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to human-induced erosion and recreational activities.
Malahide Island	007	1.804	Dublin	Red	Amber	Red	Amber	Structure and Functions are assessed as U2 due to trampling from recreational activities.
Marble Hill	164	1.009	Donegal	Red	Amber	Red	Amber	Structure and Functions are assessed as U2 due to natural erosion is exacerbated by recreational use of the dunes.
Melmore	168	2.513	Donegal	Green	Green	Green	Green	All Attributes favourable (FV)
Mizen Head	018	1.042	Wexford	Green	Green	Green	Green	All Attributes favourable (FV)
Mornington	003	1.737	Meath	Amber	Green	Amber	Amber	Structure and Functions/Future Prospects are assessed as U1 as the habitat is under on-going threats from recreational pressures at this site, there is no management strategy for this habitat in the conservation plan.
Mountcharles	143	0.299	Donegal	Red	Green	Red	Red	Structure and functions are assessed as U2 due to an excessive cover of unhealthy *Ammophila arenaria* (Marram). Future Prospects are assessed as U2 due to on-going damage caused by intensive stock rearing practices.
Mullansole	142	2.101	Donegal	Red	Amber	Amber	Red	Future Prospects are assessed as U2 due to the on-going threats from recreational activities and the management of the foredune area in relation to coastal protection.
North Bull	010	7.011	Dublin	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to erosion and recreational pressures.
Pennycomequick	019	0.698	Wicklow	Red	Green	Red	Amber	Structure and functions rated U2 due to condition of the habitat. Future Prospects rated U1 due to sediment starvation and ongoing decline.
Portmarnock	009	3.726	Dublin	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to human-induced erosion and recreational activities. Also due to hard coastal protection installed by the golf course.

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CMP Site Name	CMP Site Code	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Portrane	006	1.232	Dublin	Red	Amber	Green	Red	Future Prospects are assessed U2 due to the recreational pressures and hard coastal protection on the site.
Rinclevan	162	5.746	Donegal	Red	Green	Red	Amber	Structure and functions are assessed as U2 due to recreational activities and an excessive cover of unhealthy *Ammophila arenaria* (Marram). Future Prospects are assessed as U1 due to recreational pressures and erosion.
Rosapenna	166	5.855	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to the limited extent and restricted distribution of habitat, and recreational pressures.
Roshin Point	150	0.389	Donegal	Amber	Green	Amber	Green	Structure and Functions rated as U1 due to some unhealthy *Ammophila arenaria* (Marram).
Rosmurrevagh	112	0.365	Mayo	Amber	Amber	Green	Green	Owing to scarcity of habitat, Extent rated as U1.
Ross	130	1.435	Mayo	Red	Amber	Red	Red	Extent is assessed as U1 due to the limited area and restricted zonation of habitat. Structure and functions are assessed as U2 due to an excessive proportion of unhealthy vegetation. Future Prospects are assessed as U2 due to erosion and sediment depletion.
Ross (Subsite)	200	0.146	Mayo	Red	Red	Green	Amber	Extent is assessed as U1 due to the very limited area and restricted zonation of habitat. Future Prospects are assessed as U1 due to erosion and recreational pressures.
Rossbehy	068	10.418	Kerry	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to erosion and recreational pressures.
Rosses Point	135	0.174	Sligo	Red	Red	Red	Red	All parameteres are assessed as U2 due to recreational pressures.
Rosslare	036	2.245	Wexford	Red	Red	Red	Red	All parameters are assessed as U2 due to human-induced erosion and recreational activities. Also due to hard coastal protection installed by the golf course.
Rossnowlagh	141	1.3	Donegal	Red	Amber	Red	Amber	Structure and Functions assessed as U2 due to high cover of dead or dying *Ammophila arenaria* (Marram), severe alteration of the habitat by recreational pressures and presence of rock armour.
Rush Sandhills	005	0.979	Dublin	Amber	Amber	Green	Amber	Structure and Functions/Future Prospects are assessed as U1 due to recreational activities.
Sheskinmore	148	17.246	Donegal	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to recreational activities associated with the caravan park.
South Bull	011	5.147	Dublin	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to erosion, recreational pressures and the impact of motorised vehicles.

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CMP Site Name	CMP Site Code	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Srah North	122	1.630	Mayo	Red	Green	Red	Amber	Structure and Functions are assessed as U2 due to an excessive proportion of unhealthy vegetation, and damage from recreational pressures. Future Prospects are assessed as U1 due to erosion and recreational pressures.
Srah South	121	2.295	Mayo	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to erosion, and trampling by livestock.
Strandhill	133	5.476	Sligo	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to recreational activities associated with the Blue Flag beach, golf course, caravan park and surfing.
Streedagh Point	137	2.116	Sligo	Red	Red	Red	Red	Extent is assessed as U2 due to severe erosion and poor zonation of habitat. Structure and Functions are assessed as U2 due to an excessive proportion of unhealthy vegetation. Future Prospects are assessed as U2 due to erosion and recreational pressures.
Tacumshin	040	7.906	Wexford	Green	Green	Green	Green	All Attributes favourable (FV)
Termoncarragh Lough	127	2.577	Mayo	Amber	Amber	Green	Amber	Extent is assessed as U1 due to the limited area and poor zonation of habitat. Future Prospects are assessed as U1 due to erosion, sediment depletion, and trampling by livestock.
The Raven	035	5.231	Wexford	Amber	Amber	Amber	Amber	Extent, Structure and Functions, and Future Prospects are assessed as U1 due to erosion and recreational pressures.
Tramore	046	4.122	Waterford	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures.
Tranarossan	167	2.669	Donegal	Red	Amber	Red	Red	Extent is rated as U1 due to the limited area and poor zonation of habitat. Structure and Functions are assessed as U2 due to an excessive proportion of unhealthy vegetation. Future Prospects are assessed as U2 due to erosion, sediment depletion and recreational pressures.
Trawalua	138	5.033	Sligo	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 due to erosion of habitat by pony trekking.
Trawboy	117	3.336	Mayo	Green	Green	Green	Green	All Attributes favourable (FV)
Tullagh	177	4.124	Donegal	Green	Green	Green	Green	All Attributes favourable (FV)
Ventry	071	1.262	Kerry	Amber	Amber	Green	Amber	Extent and Future prospects rated U2 due to sediment depletion.
Warren (Creggane)	062	0.265	Cork	Green	Green	Green	Green	All Attributes favourable (FV)
Waterville	067	0.756	Cork	Amber	Amber	Green	Amber	Extent is assessed U1 due to erosion while Future Prospects rated as U1 due to lack of control of agricultural management.
White Strand	081	2.151	Clare	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to trampling and erosion caused by recreational activities.

Appendix 5.5 EU Conservation status of Fixed dune (Annex I priority habitat 2130) in Ireland

Site name	Site code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Agleam	124	318.688	Mayo	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to agricultural improvement, stripe fencing and overgrazing / undergrazing.
Aillebrack	100	1.319	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures.
Ardamine	026	2.710	Wexford	Red	Red	Amber	Red	Extent and Future Prospects rated U2 largely due to partial destruction of habitat through erosion.
Ards	165	12.074	Donegal	Amber	Green	Amber	Amber	Structure and Functions, and Future Prospects are assessed as U1 due to an excessive proportion of rank, ungrazed sward with low species diversity and invading scrub species.
Arklow North	020	1.606	Wicklow	Red	Amber	Red	Amber	Extent is assessed as U1 due to scrub encroachment. Structure and Functions and Future Prospects are assessed as U2 due to the occurrence of negative indicator species and an excessive proportion of bare ground.
Arklow South	021	0.394	Wicklow	Red	Red	Red	Red	Extent, Structure and Functions, and Future Prospects are assessed as U2 due to heavy recreational pressures, low species diversity, and damage and loss of area caused by construction works.
Ballybla	014	10.564	Wicklow	Amber	Amber	Green	Amber	Extent and Future Prospects rated U1 due to limited dynamic and lack of grazing coupled with considerable recreational impacts.
Ballybunion	079	2.042	Kerry	Red	Red	Red	Red	All attributes rated U2 due to loss of habitat to golf course and condition of habitat.
Ballydavid	073	22.026	Kerry	Red	Amber	Red	Amber	Structure and Functions rated U2, while Extent and Future Prospects assessed as U1. Area is impacted by erosion, development and agricultural management of the habitat.
Ballyheige	078	42.361	Kerry	Red	Amber	Red	Red	Extent is assessed as U1 due to erosion and sediment starvation. Structure and Functions were assessed as U2 due to presence of undergrazed, rank sward with low species diversity, and the presence of negative indicator species. Future Prospects are assessed as U2 due to undesirable agricultural management practices and recreational pressures.
Ballymacoda	054	19.437	Cork	Red	Amber	Red	Amber	Structure and Functions are rated as U2, while Extent and Future Prospects. Habitat condition and diversity is poor.
Ballymastocker	173	24.178	Donegal	Amber	Green	Green	Amber	Future Prospects rated as U1 due to lack of large grazers, encroachment of species and high recreational pressure.
Ballynaclash	033	2.477	Wexford	Red	Amber	Red	Amber	Structure and Functions are assessed as U2 due to undergrazing.
Ballyness	161	91.1	Donegal	Red	Amber	Red	Amber	Structure and Functions rated as U2 as a result of overgrazing by rabbits, high cover of agricultural weeds and low typical species diversity.
Ballyteige Burrow	041	238.638	Wexford	Amber	Green	Amber	Green	Structure and Functions rated as U1 due to decline in the habitat due to maturing.
Ballyvergan East	053	2.086	Cork	Red	Red	Red	Red	Extent, Structure and Functions and Future Prospects are assessed as U2 due to erosion, developments, and heavy recreational pressures.
Baltray	002	27.897	Louth	Amber	Amber	Amber	Amber	Extent , Structure and Functions and Future Prospects are assessed as U1 due to recreational activities and the associated activities of the golf course.

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Site name	Site code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Banna Strand	077	143.934	Kerry	Red	Green	Red	Amber	Structure and Functions rated U2 and Future Prospects are assessed as U1. Dunes are largely rank, undergrazed and negative indicator species such as *Senecio* are widespread.
Bannow Island	042	3.233	Wexford	Amber	Amber	Green	Amber	Extent and Future Prospects rated U1 due to natural erosion, sediment depletion, and the spread of scrub.
Barley Cove	064	21.748	Kerry	Green	Green	Green	Green	All attributes favourable (FV)
Barley Cove (Subsite - Golf course)	208	9.660	Kerry	Green	Green	Green	Green	All attributes favourable (FV)
Bartragh Island	131	120.216	Mayo	Amber	Green	Amber	Green	Structure and Functions rated U1 due to occasional presence of negative indicator species.
Bartraw	111	12.261	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Beal Point	080	28.144	Kerry	Amber	Amber	Amber	Amber	Extent, Structure and Functions, and Future Prospects are assessed as U1 due to erosion, sand and gravel extraction, supplementary feeding of stock, and the presence of some rank, undergrazed sward with low species diversity.
Bishopsquarter	088	4.849	Clare	Red	Amber	Red	Red	Extent is assessed as U1, and Future Prospects are assessed as U2 due to erosion, caused by intensive livestock rearing practices and recreational use. Structure and Functions are assessed as U2 due to excessive bare ground, and a lack of typical species.
Brittas Bay	017	44.94	Wicklow	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects rated as U1 due to maturing sand dune system and considerable pressure from recreational users.
Bunduff	139	40.021	Sligo	Amber	Amber	Green	Green	Extent rated as U1 as a result of high recreational activities leading to erosion.
Bunmahon	047	2.313	Waterford	Red	Amber	Amber	Red	Future Prospects rated U2, while Structure and Functions and Extent rated U1. This is largely due to the development of large parts of the habitat as a caravan park and the decline in condition of the remaining portion.
Cahore Point North	028	78.303	Wexford	Amber	Amber	Amber	Amber	Extent, Structure and Functions, and Future Prospects are assessed as U1 due to erosion, the spread of *Pteridium aquilinum* (Bracken) and scrub species, and the presence of bare and eroded tracks.
Cahore Point South	029	7.280	Wexford	Red	Amber	Red	Amber	Extent and Future Prospects are assessed as U1, and Structure and Functions are assessed as U2, due to scrub encroachment, undergrazing, and intense recreational pressures.
Carnboy	156	61.3	Donegal	Amber	Amber	Amber	Amber	All attributes assessed as U1 as a result of expansion of an airport, erosion due to high recreation and lack of large grazers.
Carnsore	039	48.793	Waterford	Red	Green	Amber	Red	Structure and Functions rated as U2 due to decline in condition of the vegetation. Future Prospects rated as U1 largely due to recreational impacts.
Castlefreke	060	26.593	Cork	Red	Amber	Red	Green	Structure and Functions is assessed as U2 due to a lack of grazing, however recently part of the site is managed by NPWS for grazing.

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Site name	Site code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Castlegregory	075	225.73	Kerry	Amber	Amber	Amber	Green	Extent and Structure and Functions are assessed as U1 due to human induced erosion from recreation and overgrazing by cattle. Also due to the invasion of the dunes by *Hippophae rhamnoides*.
Cloghmoyle	110	4.031	Mayo	Red	Green	Amber	Red	Structure and Functions rated U2 due to widespread presence of negative indicator species. Future Prospects rated as U1 due to continued use of habitat for horse-riding school.
Clooney	149	43.6	Donegal	Amber	Amber	Amber	Amber	All attributes assessed as U1 as a result of expansion of a golf course, erosion, sand extraction, high cover of agricultural weeds and agricultural improvement.
Coney Island	134	37.262	Sligo	Red	Amber	Red	Red	Structure and Functions/Future Prospects are assessed as U2 due to damage caused by the activities of a large rabbit population and also agricultural activities.
Courtown	025	0.543	Wexford	Red	Red	Amber	Red	Extent and Future Prospects U2 due to partial destruction of habitat due to erosion. Structure and Functions rated as U1 due to presence of negative indicator species.
Cross Lough	126	186.753	Mayo	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to agricultural improvement, stripe fencing and overgrazing.
Cruisetown	001	1.784	Louth	Red	Red	Red	Red	All parameters are assessed as U2. The fixed dune is experiencing 'coastal retreat' and natural erosion is compounded by recreational activities.
Cruit Lower	154	32	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects rated as U1 due to new houses and undergrazing.
Crummie's Bay	175	13.849	Donegal	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to undergrazing and the spread of scrub species.
Culdaff	181	18.103	Donegal	Red	Green	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to undergrazing, scrub encroachment, and amenity and development pressures.
Cunnigar Point	050	8.597	Waterford	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to overgrazing and supplementary feeding of stock.
Curracloe	034	30.516	Wexford	Red	Red	Red	Amber	Extent and Structure & Functions rated U2 due to human-induced erosion and invasion by *Pteridium aquilinum*. Future prospects rated as U1due to recreational pressures.
Derrybeg	157	5.4	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects rated as U1 as a result of high recreation leading to erosion and undergrazing.
Derrymore Island	076	0.334	Kerry	Red	Red	Red	Red	Extent, Structure and Functions and Future Prospects are assessed as U1 due to erosion, recreational pressures and the prevalence of negative indicator species.
Derrynane	066	22.075	Kerry	Green	Green	Green	Green	All attributes favourable (FV)
Doagh Isle	178	335.828	Donegal	Red	Amber	Red	Amber	Structure and Functions are assessed as U2 due to undergrazing.
Doaghmore	170	26.306	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Dog's Bay (& Gorteen Bay)	097	44.6	Galway	Amber	Amber	Amber	Green	Extent and Structure and functions rated as U1 due to erosion by farm vehicles and undergrazing.

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Site name	Site code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Donaghmore	027	0.056	Wexford	Red	Red	Green	Red	Extent and Future Prospects are assessed as U1 due to the widespread invasion of scrub.
Doo Lough	120	53.720	Mayo	Amber	Amber	Amber	Amber	Extent is assessed as U1 due to erosion. Structure and functions were assessed as U1 due to the presence of some rank, undergrazed sward. Future Prospects are assessed as U1 due to erosion, and trampling by livestock.
Dooaghtry	108	75.561	Mayo	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to overgrazing by cattle, sheep and rabbits and human induced erosion from recreation. The site is in multiple ownership making it difficult to manage for conservation.
Dooey	160	94.826	Donegal	Amber	Green	Green	Amber	Future Prospects rated U1 due to lack of grazing of the sward.
Dooyork	119	3.732	Mayo	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to excessive bare ground, and trampling by livestock.
Duncannon	044	1.226	Wexford	Red	Red	Amber	Red	Extent and Future Prospects rated as U2 owing to spread of Hippophae scrub and development of land for housing and tourism.
Dunfanaghy	163	17.6	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects rated as U1 as a result of expansion by a golf course and undergrazing.
Dunfanaghy (Subsite-Dunfanaghy Bay)	205	12.7	Donegal	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to overgrazing by rabbits and invasion of species.
Eararna	091	58.106	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Fahan	174	12.990	Donegal	Red	Amber	Red	Amber	Structure and Functions rated U2, while Extent and Future Prospects rated U1 due to the volume of recreational users at the small site.
Fanore	087	61.874	Clare	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to the intensive recreational management of the site, the spread of an invasive species, supplementary feeding of stock, and the presence of worn and eroded tracks.
Fermoyle	074	3.246	Kerry	Red	Red	Amber	Red	Extent and Future Prospects assessed as U2 while Structure and Functions rated U1. Habitat has been degraded through intensive agricultural management coupled with natural erosion.
Fermoyle (Subsite - Drom Hill)	204	6.750	Kerry	Green	Green	Green	Green	All attributes favourable (FV)
Finner	140	95.129	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to the presence of the military camp and lack of grazing.
Finner (Subsite - Ballymacaward)	211	44.392	Donegal	Red	Amber	Red	Red	Structure and Functions and Future Prospects are assessed as U2 as the dunes are managed for agricultural purposes. The damaging activities, such as stock feeding, overgrazing, reseeding and trampling are damaging the fixed dunes and threatening the viability of the habitat.
Fintragh	145	7.023	Donegal	Red	Red	Amber	Red	Extent is assessed as U2 due to the presence of two sports pitches and Structure and Functions are assessed as U2 due to overgrazing.
Fisherstreet	200	15.401	Clare	Red	Red	Red	Red	All attributes rated U2 due to agricultural management.

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Site name	Site code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Garretstown	056	1.82	Cork	Red	Red	Red	Red	All three attributes rated as U2 owing to the lack of habitat and its poor condition.
Garter Hill	128	232.887	Mayo	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to overgrazing by cattle, sheep and rabbits inducing erosion. Dumping is also a main impact here.
Glen Bay	146	13.512	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to erosion, agricultural improvement, crop cultivation and recreational pressures.
Gola Island	158	3.377	Donegal	Red	Green	Red	Amber	Structure and Functions assessed as U2 as a result of undergrazing leading to low species diversity.
Gowlaun	107	9.728	Galway	Amber	Green	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to erosion, agricultural improvement, crop cultivation and recreational pressures.
Grange	043	0.848	Wexford	Red	Red	Amber	Red	Extent and Future Prospects rated as U2 due to severe erosion and recreational impacts.
Harbour View	057	4.552	Cork	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the presence of both pedestrian and vehicle tracks.
Inch	070	352.236	Kerry	Green	Green	Green	Green	All attributes favourable (FV)
Inchydoney	058	17.814	Cork	Amber	Green	Amber	Amber	Structure and Functions are assessed as U1 due to an excessive amount of undergrazed sward with low species diversity, and an excessive cover of negative indicator species. Future Prospects are assessed as U1 due to recreational pressures, undergrazing, and the spread of invasive species.
Inishcrone	132	40	Sligo	Red	Amber	Red	Amber	Structure and Functions assessed as U2 due to undergrazing.
Inisheer	089	4.597	Galway	Amber	Amber	Green	Amber	Extent and Future Prospects rated U1 due to loss of habitat due to sand extraction and presence of airport.
Inver	144	0.783	Donegal	Red	Red	Red	Red	Extent, Structure and Functions and Future Prospects are assessed as U2 due to erosion, overgrazing by cattle and rabbits, supplementary feeding of stock, and scrub encroachment.
Keadew	153	15.683	Donegal	Amber	Green	Amber	Green	Structure and Functions are assessed as U1 due to overgrazing in parts and abandonment of grazing in other parts.
Kilcoole	013	5.504	Wicklow	Red	Amber	Green	Red	Future Prospects rated as U2 due to erosion of the remnant band of dune grassland.
Kilgorman	024	0.324	Wexford	Red	Amber	Red	Red	Extent and Future Prospects are assessed as U1 due to invasion by scrub species. Structure and Functions are assessed as U1 due to the presence of rank, ungrazed sward with low species diversity.
Killiney	012	0.395	Dublin	Red	Red	Amber	Red	Extent and Future Prospects rated as U2 due to limited extent and unsuitable terrain for expansion. Structure and Functions rated as U1.
Kilmuckridge	030	22.094	Wexford	Red	Red	Amber	Red	Extent and Future Prospects rated U2 due to agricultural destruction of large swathes of land.

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Site name	Site code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Kilpatrick	023	12.992	Wicklow	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to erosion, high recreational pressures and areas of agricultural improvement.
Kincaslough	155	63.94	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to new houses, invasion of species, agricultural practices, undergrazing and overgrazing in places, low species diversity, high cover of agricultural weeds.
Lackan	129	99.860	Mayo	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to erosion, undergrazing, and development pressures.
Lackan (Subsite)	201	3.511	Mayo	Red	Green	Red	Amber	Structure and Functions are assessed as U2, and Future Prospects as U1, due to agricultural improvement, low species diversity and the presence of negative indicator species.
Lag	179	107.917	Donegal	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to spread of scrub species and *Pteridium aquilinum* (Bracken), agricultural improvement, and supplementary feeding of stock.
Lahinch	085	17.665	Clare	Red	Green	Red	Amber	Structure and Functions are assessed as U2 due to agricultural improvement of the land.
Laytown	004	5.631	Meath	Red	Red	Amber	Red	Extent is assessed as U2 due to the invasion of scrub and also due to erosion caused by the construction of a sea wall further north.
Leam Lough	125	171.752	Mayo	Amber	Green	Amber	Amber	Structure and Functions are assessed as U1 due to agricultural improvement, undergrazing in parts of the habitat, and the presence of negative indicator species. Future Prospects are assessed as U1 due to an intensification of agricultural management practices.
Lenankeel	176	11.4	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects assessed as U1 due to development of new houses and damage due to agricultural practices.
Lettermacaward	151	139.985	Donegal	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1overgrazing and undergrazing in places, some agricultural improvement, and high recreational practices leading to erosion.
Lough Cahasy	109	40.276	Mayo	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects rated U1 due to lack of appropriate management of the largely rank and disturbed habitat.
Lough Nagreany	169	7.645	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Lunniagh	159	186.723	Donegal	Amber	Amber	Green	Amber	Extent is assessed as U1 due to erosion, and loss of area to agriculture and sports pitches. Future Prospects are assessed as U1 due to sand extraction, camping and caravans, recreational pressures, vehicle damage and dumping.
Lurga Point	083	35.511	Clare	Red	Amber	Amber	Red	Extent is assessed as U1 due to erosion. Structure and Functions and Future Prospects are assessed as U1 due to an excessive cover of negative indicator species, supplementary feeding of livestock, overgrazing by rabbits, recreational pressures and erosion.
Maghera	147	28	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects assessed as U1 due to natural erosion, undergrazing and invasion of species.

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Site name	Site code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Maghera (Subsite)	202	2.8	Donegal	Red	Green	Red	Amber	Structure and Functions are assessed as U2 due to the abandonment of grazing and high cover of agricultural weeds resulting in low species diversity.
Magherabeg	016	7.951	Wicklow	Red	Green	Red	Amber	Structure and Functions are assessed as U2, and Future Prospects are assessed as U1 due to undergrazing and the spread of scrub and negative indicator species.
Maheradrumman	172	54.742	Donegal	Red	Amber	Red	Amber	Structure and Functions are assessed as U2 due to the abandonment of grazing.
Malahide Island	007	21.430	Dublin	Amber	Amber	Amber	Green	Extent, Structure and Functions and Future Prospects are assessed as U1. Extent – due to human induced erosion from recreational activities. Structure and Functions – due to a lack of grazing.
Marble Hill	164	31.065	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to invasion of the dunes by *Pteridium aquilinum* and *Hippophae rhamnoides*. The site is undergrazed and impacted by recreational activities.
Melmore	168	20.860	Donegal	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects rated U1 owing to decline in the condition of habitat and development of land for caravan parks.
Mizen Head	018	41.636	Wicklow	Amber	Green	Amber	Green	Structure and Functions rated as U1 owing to abandonment of agricultural practices/grazing and the decline in the condition of the habitat.
Mornington	003	20.749	Meath	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1. Extent – due to human induced erosion from recreational activities. Structure and Functions – due to a lack of grazing.
Mount Charles	143	7.821	Donegal	Red	Amber	Red	Red	Extent is assessed as U1, and structure and functions and future prospects as U2, due to erosion, overgrazing by cattle and rabbits, trampling by stock, vehicular damage, scrub encroachment and an excessive cover of negative indicator species.
Mullanasole	142	20.152	Donegal	Red	Amber	Red	Amber	Structure and Functions are assessed as U2 due to the impacts of the conifer plantation and also due to undergrazing.
North Bull	010	34.277	Dublin	Amber	Green	Amber	Amber	Structure and Functions are assessed as U1 due to the presence of some rank, ungrazed sward with low species diversity. Future Prospects are assessed as U1 due to high recreational pressures and overgrazing by rabbits.
Owenahincha & Little Island Strand	061	4.776	Cork	Red	Amber	Red	Red	Extent is assessed as U1 due to housing developments. Structure and Functions are assessed as U2 due to low species diversity, a lack of short turf and the spread of negative indicator species. Future Prospects are assessed as U2 due to recreational pressures, housing developments and the lack of statutory protection due to the non-designated status of the site.
Pennycomequick	019	11.431	Wicklow	Red	Amber	Red	Red	All three attributes rated as U2 due to decline in the condition of the habitat and the spread of *Pteridium aquilinum* (Bracken) and (*Rubus fruticosus*) bramble.
Portmarnock	009	4.514	Dublin	Red	Red	Amber	Amber	Extent is assessed as U2. The boundary between the golf course and the fixed dune was not clear in places on the ground during this survey. Part of the fixed dunes (approx. 15ha) at the tip of the spit appears to lie within the cSAC and has been modified by the golf course.

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Site name	Site code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Portmurvy	092	2.457	Galway	Amber	Amber	Green	Amber	Extent and Future Prospects rated U1 due to limited distribution of habitat and land use practices.
Portrane	006	5.712	Dublin	Red	Amber	Amber	Red	Future Prospects are assessed as U2 due to recreational and development pressures on this habitat.
Rinclevan	162	298.607	Donegal	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to overgrazing by sheep and rabbits, supplementary feeding of livestock, recreational pressures, and the spread of scrub and negative indicator species.
Rosapenna	166	221.936	Donegal	Red	Red	Amber	Amber	Extent is assessed as U2 due to golf course developments. Structure and Functions and Future Prospects are assessed as U1 due to overgrazing by rabbits, vehicle tracks, high recreational pressures, supplementary feeding of stock and dumping.
Roshin Point	150	3.613	Donegal	Red	Green	Red	Amber	Structure and Functions are assessed as U2 due to undergrazing leading to low species diversity and rank vegetation with a high cover of agricultural weeds.
Ross	130	78.586	Mayo	Red	Green	Red	Amber	Structure and Functions are assessed as U2 due to a lack of typical species and the excessive cover of rank, undergrazed sward. Future Prospects are assessed as U1 due to undergrazing and supplementary feeding of stock.
Ross (Subsite)	200	24.888	Mayo	Red	Green	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to agricultural improvement and the on-going intensive agricultural management of the site.
Rossbehy	068	99.072	Kerry	Amber	Amber	Amber	Amber	Extent is assessed as U1 due to human-induced erosion. Structure and Functions are assessed as U1 due to undergrazing, the presence in places of a rank, ungrazed sward, and negative indicator species. Future Prospects are assessed as U1 due to erosion, undergrazing, and camping and caravans.
Rosses Point	135	22.181	Sligo	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to the associated impacts of the golf course.
Rosslare	036	2.350	Wexford	Red	Red	Red	Red	All parameters are U2 due to loss of habitat caused by changes in sediment circulation as a result of the presence of Rosslare Harbour. Coastal protection works installed to protect the golf course.
Rossnowlagh	141	27.3	Donegal	Red	Red	Red	Red	Extent, Structure and Functions and Future Prospects are assessed as U2 due to developments of caravan parks, hotels and severe alteration of the habitat with only remnants remaining
Rush Sandhills	005	3.363	Dublin	Red	Red	Amber	Amber	Extent is assessed as U2 due to the invasion of *Hippophae rhamnoides.*
Shanagarry	055	5.678	Cork	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects rated U1due to rank nature of sward and low species diversity.
Sheskinmore	148	224.370	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to recreational activities associated with the caravan park. Also, parts of the fixed dunes are undergrazed.

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Site name	Site code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Sheskinmore (Subsite-Derryness)	212	20.763	Donegal	Red	Green	Red	Red	Structure and Functions and Future Prospects are assessed as U2. The dunes are managed for agricultural purposes and the damaging activities, such as stock feeding, overgrazing, reseeding, threaten the viability of the habitat.
South Bull	011	53.920	Dublin	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to recreational pressures and the presence in places, of a rank, ungrazed sward.
Spanish Point	084	1.233	Clare	Red	Red	Red	Red	All parameters are assessed as U2 due to the pressures from recreational activities and development.
Srah North	122	5.987	Mayo	Red	Green	Red	Amber	Structure and Functions are assessed as U2 due to undergrazing and damage from vehicle tracks. Future Prospects are assessed as U1 due to undergrazing, recreational pressures and damage from vehicle tracks.
Srah South	121	10.085	Mayo	Amber	Amber	Green	Amber	Extent is assessed as U1 due to erosion caused by livestock movements. Future Prospects are assessed as U1 due to supplementary feeding of livestock.
St. Margaret's	038	4.033	Waterford	Red	Amber	Amber	Red	Extent and Structure and Functions are assessed as U1, and Future Prospects are assessed as U2 due to erosion, recreational pressures, and the spread of invasive species.
Strandhill	133	105.846	Sligo	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1. Extent - due to the presence of a conifer plantation and human-induce erosion. Structure and Functions due to undergrazing.
Streedagh Point	137	82.989	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to erosion, recreational pressures, and an excessive cover, in some areas, of negative indicator species.
Tacumshin	040	35.561	Wexford	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects rated as U1 due to decline in condition of the vegetation due in part to the coarse nature of the sediment and recreational impacts.
Termoncarragh Lough	127	230.596	Mayo	Red	Green	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to the on-going agricultural improvements that have resulted in low species diversity, and the spread of negative indicator species.
The Raven	035	26.937	Wexford	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to high recreational pressures and erosion.
Tramore	046	57.53	Waterford	Red	Amber	Red	Amber	Extent is assessed as U1 due to erosion caused by recreational pressures. Structure and Functions are assessed as U2 due to a lack of typical species and lack of short turf. Future Prospects are assessed as U1 due to recreational pressures and undergrazing.
Tramore(Subsite)	246	4.551	Waterford	Red	Green	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to a lack of species-rich short turf, low species diversity, sand extraction, and disturbance caused by agricultural activities.
Tranarossan	167	15.958	Waterford	Amber	Green	Green	Amber	Future prospects are assessed as U1 due to erosion, and intensive stock rearing practices in parts of the site.

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Site name	Site code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Trawalua	138	75.732	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects rated as U2 as a result of erosion by pony trekking and undergrazing.
Trawboy	117	48.49	Mayo	Amber	Green	Amber	Green	Structure and Functions rated as U1 as a result of undergrazing in some areas.
Tullagh	177	30.844	Donegal	Amber	Green	Green	Amber	Future Prospects rated U1 due to and recreational impacts and a decline in the condition of the habitat .
Ventry	071	12.237	Kerry	Red	Red	Amber	Amber	Extent is rated as U2, while Structure and Functions and Future Prospects are assessed as U1. Remnant habitat is highly degraded through erosion, sediment depletion and agricultural management.
Warren (Creggane)	062	5.664	Kerry	Amber	Amber	Green	Amber	Extent and Future prospects rated as U1 due to loss of habitat to golf course and installation of coastal protection works for recreational purposes.
Waterville	067	12.038	Kerry	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1. Extent – due to human induced erosion from recreational activities and the invasion of *Pteridium aquilinum.* Future Prospects – due to the management of the site for recreation.
White Strand	180	2.34	Donegal	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects assessed as U1 as a result a road fragmenting the habitat, agricultural practices and undergrazing.
White Strand	081	12.005	Clare	Red	Red	Amber	Green	Extent is assessed as U2 due to the recent loss of fixed dune to the development of a golf course.
Woodstown	045	1.359	Waterford	Red	Red	Red	Red	The fixed dune is experiencing 'coastal squeeze', it is restricted landward by development and seaward by human induced/natural erosion.
Yellow Strand	136	22.084	Sligo	Red	Red	Red	Red	All parameters are assessed as U2 due to agricultural improvement of the land.

Appendix 5.6 EU Conservation status of Decalcified fixed dunes with *Empetrum nigrum* (Annex I Priority habitat 2140) in Ireland

CMP Site Name	CMP Site No.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comments
Crummies Bay	175	0.03	Donegal	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the threat of invasion by an adjacent stand of *Pteridium aquilinum* (Bracken).
Keadew	153	0.351	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Maghera	147	0.47	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Sheskinmore	148	2	Donegal	Green	Green	Green	Green	All attributes favourable (FV)

Appendix 5.7 EU Conservation status of Atlantic decalcified fixed dunes (Calluno-Ulicetea) (Annex I Priority habitat 2150) in Ireland

CMP Site Name	CMP Site No.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comments
Agleam	124	7.671	Mayo	Amber	Green	Amber	Green	Structure and Functions is assess as U1 due to agricultural impacts.
Brittas Bay	017	0.79	Wicklow	Amber	Amber	Green	Green	Extent rated U1 due to loss of habitat through development and impacts from recreational users of the beach.
Cruit Lower	154	3.6	Donegal	Green	Green	Green	Green	All Attributes Favourable (FV)
Lough Nagreany	169	1.347	Donegal	Green	Green	Green	Green	All Attributes Favourable (FV)
Maghera	147	16.828	Donegal	Green	Green	Green	Green	All Attributes Favourable (FV)
Sheskinmore	148	40	Donegal	Green	Green	Green	Green	All Attributes Favourable (FV)
Termoncarragh Lough	127	6.204	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to overgrazing.

Appendix 5.8 EU Conservation status of Dunes with *Salix repens* ssp. *argentea* (Salicion arenaria) (Annex I habitat 2170) in Ireland

CMP Site Name	CMP Site No.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comment
Aghleam	142	27.486	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the strip fencing and associated agricultural management of the site threatens the viability of the habitat.
Ballymastocker	124	0.32	Donegal	Amber	Green	Green	Amber	Future Prospects assessed as U1 due to invasion of species and trampling.
Castlegregory	070	45.775	Kerry	Green	Green	Green	Green	All attributes favourable (FV)
Cruit Lower	035	1	Donegal	Amber	Green	Green	Amber	Future Prospects assessed as U1 due to undergrazing.
Derrybeg	075	1	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Doaghmore	157	2.56	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Doonloughan	154	0.789	Galway	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to overgrazing.
Inch	155	0.343	Kerry	Green	Green	Green	Green	All attributes favourable (FV)
Kincaslough	148	0.043	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Lag	147	0.182	Donegal	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the spread of invasive species and the use of adjacent areas for supplementary feeding of stock.
Lough Nagreany	170	4.203	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Maghera	101	0.6	Donegal	Amber	Green	Amber	Amber	Structure and functions and Future Prospects assessed as U1 due to undergrazing and scrub encroachment.
Mullanasole	133	7	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to the presence of the conifer plantation.
Rinclevan	169	14.707	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Sheskinmore		2.26	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Strandhill	162	10	Sligo	Amber	Amber	Green	Amber	Extent is assessed as U1 due to the presence of the conifer plantation. Future Prospects is assessed as U1 due to a lack of grazing.
The Raven	173	0.112	Wexford	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the potential negative impacts of forestry management and recreational pressures.

Appendix 5.9 EU Conservation status of Humid dune slack (Annex I H2190) in Ireland

CMP Site Name	CMP Code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Agleam	124	19.82	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the intensification of grazing and supplementary feeding in the strip fields.
Aillebrack	100	0.652	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to sand extraction, and leisure activities.
Arklow North	020	0.113	Wicklow	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the encroachment of scrub, and recreational pressures.
Ballydavid	073	0.302	Kerry	Red	Red	Red	Amber	Extent and Structure and Functions rated U2 owing to habitat degradation and agricultural management of the area.
Ballyheige	078	0.404	Kerry	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the occurrence of negative indicator species, and trampling by livestock.
Ballymastocker	173	0.663	Donegal	Amber	Green	Amber	Green	Structure and functions assessed as U1 due to high cover of agricultural weeds and grasses in one area of habitat.
Ballyness	161	13.9	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Ballyteige Burrow	041	6.322	Wexford	Green	Green	Green	Green	All attributes favourable (FV)
Banna Strand	077	3.358	Kerry	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to spread of agricultural invasive weeds.
Bartragh Island	131	1.221	Mayo	Green	Green	Green	Green	All attributes favourable (FV)
Brittas Bay	017	0.674	Wicklow	Amber	Green	Green	Amber	Future Prospects are rated as U1 owing to a documented lowering of the water table.
Cahore Point North	028	1.003	Wexford	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the threat of scrub encroachment.
Carnboy	156	0.4	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Carnsore	039	1.058	Waterford	Red	Amber	Amber	Red	Future prospects rated U2 due to lowering of water table. Extent and Structure and Functions rated U1 due to reduction in size and condition of the habitat.
Castlefreke	060	0.15	Cork	Amber	Amber	Green	Green	Extent is rated as U1 due to recreational activities.
Castlegregory	075	29.799	Kerry	Green	Green	Green	Green	All attributes favourable (FV)

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CMP Site Name	CMP Code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Coney Island	134	0.239	Sligo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the uncontrolled rabbit population and threats from agricultural activities.
Cross Lough	126	0.255	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to threats from agricultural activities.
Cruit Lower	154	0.6	Donegal	Red	Green	Red	Amber	Structure and Functions assessed as U2 due to undergrazing.
Culdaff	181	0.283	Donegal	Amber	Green	Amber	Amber	Structure and Functions are assessed as U2 due to the occurrence of negative indicator species, and the adverse affects of drainage works. Future Prospects are assessed as U1 due to development and amenity pressures.
Curracloe	034	0.378	Wexford	Red	Red	Red	Red	All parameters are assessed as U2 due to the development of a car park on part of the dune slack.
Derrybeg	157	0.3	Donegal	Green	Green	Green	Green	All attributes favourable
Derrynane	066	0.103	Kerry	Green	Green	Green	Green	All attributes favourable
Doagh Isle	178	6.848	Donegal	Red	Green	Red	Amber	Structure and Functions are assessed as U2 due to overgrazing.
Doaghmore	170	0.763	Wexford	Green	Green	Green	Green	All attributes favourable (FV)
Dog's Bay (& Gorteen Bay)	097	0.098	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Doo Lough	120	1.56	Mayo	Amber	Green	Green	Amber	Future Prospects assessed as U1
Dooaghtry	108	0.67	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the on-going threats from overgrazing.
Dunfanaghy	163	1.2	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 due to undergrazing.
Fermoyle (Subsite - Drom Hill)	204	0.42	Kerry	Green	Green	Green	Green	All attributes favourable (FV)
Garter Hill	128	0.103	Mayo	Red	Amber	Red	Amber	Structure and Functions is assessed as U2 due to overgrazing.

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CMP Site Name	CMP Code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Grange	043	2.762	Wexford	Green	Green	Green	Green	All attributes favourable (FV)
Inch	070	32.365	Kerry	Green	Green	Green	Green	All attributes favourable (FV)
Inchydoney	058	0.281	Cork	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to current presence of only dry, mature dune slacks at the site.
Kilpatrick	023	0.191	Wicklow	Red	Green	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to damage caused by livestock rearing practices.
Kincaslough	155	0.998	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Lag	179	0.657	Donegal	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to agricultural improvement.
Laytown	004	0.167	Meath	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the location of the slacks within the Rifle Range.
Leam Lough	125	1.35	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the intensive agricultural management of much of the dune system.
Lough Nagreany	169	0.464	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Lunniagh	159	5.682	Donegal	Amber	Amber	Amber	Amber	Extent is assessed as U1 due to sand extraction. Structure and Functions and Future Prospects are assessed as U1 due to sand extraction, vehicle damage and dumping.
Maghera	147	0.34	Donegal	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects assessed as U1 due to undergrazing.
Marble Hill	164	0.199	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Melmore	168	0.5	Donegal	Amber	Green	Green	Amber	Future prospects assessed as U1 due to undergrazing and rank nature of vegetation.
Mizen Head	018	0.226	Wicklow	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects rated U1 owing to agricultural abandonment of the site and unauthorised water extraction for golf course.
Mornington	3	0.932	Meath	Amber	Amber	Amber	Amber	All parameters are assessed as U1 due to undergrazing and recreational impacts.
Mullanasole	142	0.123	Donegal	Amber	Amber	Green	Amber	Extent/Future Prospects are assessed as U1 due to impacts of the conifer plantation and undergrazing.
North Bull	010	2.838	Dublin	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures, and proximity to a golf course, where intensive management may have implications for the site hydrology.

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CMP Site Name	CMP Code	Area (ha)	County	Overall	Extent	Structure and functions	Future prospects	Comments
Pennycomequick	019	0.108	Wicklow	Red	Green	Red	Red	Structure and Functions and Future Prospects rated U2 owing to the derelict and overgrown condition of the small slack.
Portmarnock	009	0.777	Dublin	Red	Red	Amber	Amber	Extent is assessed as U2 due to the extension of the golf course into the cSAC.
Rinclevan	162	38.231	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Rosapenna	166	3.27	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Ross	130	3.867	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to agricultural improvement.
Rossbehy	068	1.831	Kerry	Green	Green	Green	Green	All attributes favourable (FV)
Sheskinmore	148	4.354	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
South Bull	011	3.212	Dublin	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational pressures.
Strandhill	133	2.05	Sligo	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to the presence of the conifer plantation and lack of grazing.
Streedagh Point	137	0.678	Donegal	Amber	Green	Amber	Amber	Structure and Functions are assessed as U1 due to damage from stock feeding. Future Prospects are assessed as U1 due to the on-going agricultural management of the site.
Termoncaragh Lough	127	0.659	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the intensive agricultural management of much of the dune system.
The Raven	035	0.743	Wexford	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to the uncertainty regarding the impact of future forestry management at the site.
Trawalua	138	5.469	Sligo	Green	Green	Green	Green	All attributes favourable (FV)
Trawboy	117	0.047	Mayo	Green	Green	Green	Green	All attributes favourable (FV)
Waterville	067	0.917	Kerry	Amber	Green	Green	Amber	Future Prospects assessed as U1 as habitat under threat from agricultural management.
White Strand	081	0.234	Clare	Red	Red	Green	Amber	Extent is assessed as U2 due to the golf course.

Appendix 5.10 EU Conservation status of Machair (Annex I priority habitat* 21A0) in Ireland

Site name	Site no.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comments
Agleam	124	142.052	Mayo	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to quarrying, agricultural improvement, stripe fencing and overgrazing.
Aillebrack	100	78.493	Mayo	Amber	Amber	Green	Amber	Extent is assessed as U1 due to large-scale sand extraction; Future Prospects are assessed as U1 due to sand extraction, pony-racing and dumping.
Augrusbeg	105	19.253	Galway	Amber	Amber	Green	Amber	Extent and Future Prospects rated as U1 due to agricultural improvement and strip-fencing.
Ballyconeely	099	15.833	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Bunduff	139	48.905	Sligo	Green	Green	Green	Green	All attributes favourable (FV)
Clooney	149	8.8	Donegal	Red	Green	Red	Amber	Future Prospects is assessed as U2 due to agricultural improvement, and fencing of the habitat.
Corraun Point	115	19.9	Mayo	Amber	Green	Amber	Amber	Structure and functions and Future prospects assessed as U1 due to strip fencing, lack of grazing in some areas, overgrazing and agricultural improvement.
Cross Lough	126	60.729	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to agricultural improvement, strip-fencing and overgrazing.
Cross Lough (Subsite-Beldarra)	203	15.407	Mayo	Red	Green	Red	Amber	Structure and Functions is assessed as U2 due to agricultural improvement.
Cruit Lower	154	9.6	Donegal	Red	Amber	Red	Amber	Extent and Future Prospects assessed as U2 as a result of high recreational activities and undergrazing.
Derrybeg	157	120.8	Donegal	Amber	Amber	Amber	Amber	All three attributes assessed as U1 as a result of presence and expansion of golf course, lack of grazing in some areas and overgrazing and trampling.
Doagh Isle	178	92.516	Donegal	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1due to agricultural improvement and overgrazing of the machair. Also due to recreational activities associated with the presence of a golf course and caravan park.
Doo Lough	120	58.426	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to threats from agricultural improvement, supplementary feeding of stock and localised damage from animal tracks.
Dooaghtry	108	137.108	Mayo	Red	Amber	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to overgrazing by rabbits, sheep and cattle resulting in erosion of the machair.

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Site name	Site no.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comments
Doolan (Murvey)	098	43.104	Galway	Red	Amber	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to overgrazing of the machair by sheep and erosion induced by overgrazing.
Doonloughan	101	121.106	Mayo	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to overgrazing, erosion and extensive vehicle tracks.
Dooyork	119	31.562	Mayo	Green	Green	Green	Green	All attributes favourable (FV)
Dunfanaghy	163	2.23	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 due to presence and expansion of golf course.
Eararna	091	33.012	Galway	Amber	Amber	Amber	Amber	Extent, Structure and Functions and Future Prospects are assessed as U1 due to overgrazing by rabbits and cattle and associated erosion.
Finish Island	094	1.985	Galway	Amber	Amber	Green	Amber	Extent and Future Prospects rated U1 owing to sediment depletion and degradation of the remaining habitat.
Garter Hill	128	121.822	Mayo	Red	Amber	Red	Amber	Structure and Functions are assessed as U2 due to overgrazing and erosion.
Gortnatraw	171	20.354	Donegal	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to overgrazing, agricultural improvement, supplementary feeding of stock and recreational pressures.
Gowlaun	107	16.795	Galway	Red	Green	Amber	Red	Future Prospects rated as U2 owing to the agricultural influenced decline of the habitat. Structure and Functions rated U1.
Inishbofin	106	13.157	Mayo	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to recreational pressures and overgrazing by sheep and rabbits.
Inishkea Islands	123	108	Mayo	Amber	Amber	Amber	Amber	All three attributes assessed as U1 as a result of overgrazing.
Inishkea South (Subsite of Inishkea North)	206	7.7	Donegal	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects rated as U1 due to overgrazing resulting in natural erosion.
Inishmaan	090	46.954	Galway	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to the presence of a football pitch and agricultural activities.
Keadew	153	28.748	Donegal	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to agricultural impacts.

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Site name	Site no.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comments
Keel Lough	113	92.7	Mayo	Amber	Amber	Amber	Amber	All three attributes assessed as U1 as a result of presence and expansion of golf course, and overgrazing and trampling.
Kincaslough	155	12.24	Donegal	Amber	Amber	Green	Amber	Extent and Future Prospects assessed as U1 owing to development of new houses.
Kinrovar	118	83.937	Mayo	Red	Red	Red	Red	Extent, Structure and Functions and Future Prospects are assessed as U2 due to widespread intensification of agricultural management practices.
Leagaun	103	20.615	Galway	Amber	Amber	Green	Amber	Extent and Future Prospects are assessed as U1 due to the presence of a caravan park and one-off housing on the machair and also due to agricultural management of the site.
Leam Lough	125	45.570	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to threats from agricultural improvement and unsustainable stock rearing practices.
Lenankeel	176	27.5	Donegal	Amber	Amber	Amber	Amber	All three attributes assessed as U1owing to Strip fencing, Agricultural practices and development
Lettermacaward	151	59.395	Donegal	Red	Amber	Amber	Red	Future Prospects is assessed as U2 due to agricultural improvement, presence of sports pitch, strip fencing, drainage and scrub encroachment.
Lough Cahasy	109	15.757	Mayo	Amber	Green	Green	Amber	Future Prospects assessed as U1 owing to the agricultural degradation of this remnant machair.
Lough Doo	114	96.9	Mayo	Amber	Amber	Amber	Amber	All three attributes assessed as U1 as a result of overgrazing and the presence of a sports pitch.
Lough Nagreany	169	8.541	Donegal	Red	Amber	Red	Amber	Structure and Functions are assessed as U2 due to agricultural improvement.
Lunniagh	159	42.830	Donegal	Red	Amber	Green	Red	Extent U1 and Future prospects are assessed as U2 due to housing developments, overgrazing and vehicle tracks.
Maheradrumman	172	146.333	Donegal	Amber	Amber	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to agricultural improvement and overgrazing.
Mannin Bay	102	73.906	Galway	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to overgrazing.
Mason Island	096	4.955	Galway	Amber	Green	Amber	Green	Structure and Functions rated as U1owing to the pressure of grazing and presence of negative indicator species.

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Site name	Site no.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comments
Melmore	168	21.868	Donegal	Green	Green	Green	Green	All attributes favourable (FV)
Mweenish Island	095	20.701	Galway	Amber	Green	Green	Amber	Future Prospects rated as U1 owing to sediment depletion.
Omey Island	104	40.328	Galway	Red	Amber	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to overgrazing of the machair by sheep and erosion induced by overgrazing.
Portmurvey	092	5.202	Galway	Green	Green	Green	Green	All attributes favourable (FV)
Rinclevan	162	30.428	Donegal	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to overgrazing by sheep.
Roshin Point	150	5.305	Donegal	Red	Green	Red	Amber	Structure and Functions is assessed as U2 due to undergrazing, and strip fencing.
Rosmurrevagh	112	33.660	Mayo	Amber	Green	Amber	Green	Structure and Functions assessed as U1 owing to severity of grazing and sward height.
Sheskinmore	148	16.538	Donegal	Amber	Amber	Amber	Green	Extent and Structure and Functions are assessed as U1 due to changes in hydrology, which has resulted in a loss of habitat and due to agricultural improvement.
Srah North	122	21.761	Mayo	Red	Green	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to widespread intensification of agricultural management practices.
Srah South	121	16.072	Mayo	Amber	Green	Green	Amber	Future Prospects are assessed as U1 due to recreational use, car parking for beach access, undergrazing in parts of the site, and dumping of rubble.
Termoncaragh Lough	127	222.755	Mayo	Red	Green	Red	Red	Structure and Functions and Future Prospects are assessed as U2 due to the restructuring of agricultural land holdings and an intensification of agricultural management activities.
Tranarossan	167	74.233	Donegal	Amber	Green	Amber	Amber	Structure and Functions and Future Prospects are assessed as U1 due to intensive stock rearing practices in parts of the site, and recreational impacts associated with extensive mobile home parks.
Trawalua	138	33.389	Sligo	Green	Green	Green	Green	All attributes favourable (FV)
Trawboy	117	27.93	Mayo	Red	Amber	Amber	Red	Future Prospects rated as U2 as a result of agricultural improvement and strip fencing.
Trawboy East (Subsite of Trawboy)	207	0.86	Donegal	Amber	Green	Green	Amber	Future Prospects rated as U1 due to overgrazing.

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Site name	Site no.	Area (ha)	County	Overall	Extent	Structure and Functions	Future Prospects	Comments
Tullagh	177	20.282	Donegal	Red	Green	Red	Amber	Structure and Functions rated as U2 due to intensive agricultural improvement. Future prospects rated as U1due to ongoing development of land for houses etc.
White Strand	180	5.9	Donegal	Red	Green	Red	Amber	Structure and Functions attribute assessed as U2 as a result of undergrazing and low species diversity.