ISSN 1393 – 6670

Monitoring survey of Annex I sand dune habitats in Ireland

Irish Wildlife Manuals No. 75

An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht

Monitoring survey of Annex I sand dune habitats in Ireland

A. Delaney, F.M. Devaney, J.R. Martin, S.J. Barron

Citation:

Delaney, A., Devaney, F.M, Martin, J.M. and Barron, S.J. (2013). Monitoring survey of Annex I sand dune habitats in Ireland. *Irish Wildlife Manuals*, No. 75. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Keywords: Sand dunes, Ireland, coastal, monitoring, assessment, Habitats Directive, structure and functions, conservation status

Site list: 000020, Black Head-Poulsallagh Complex SAC; 000091, Clonakilty Bay SAC; 000147, Horn Head and Rinclevan SAC; 000164, Lough Nagreany Dunes SAC; 000190, Slieve Tooey/Tormore Island/Loughros Beg Bay SAC; 000194, Tranarossan and Melmore Lough SAC; 000197, West of Ardara/Maas Road SAC; 000199, Baldoyle Bay SAC; 000206, North Dublin Bay SAC; 000332, Akeragh, Banna and Barrow Harbour SAC; 000343, Castlemaine Harbour SAC; 000370, Lough Yganavan and Lough Nambrackdarraig SAC; 000458, Killala Bay/Moy Estuary SAC; 000470, Mullet/Blacksod Bay Complex SAC; 000500, Glenamoy Bog Complex SAC; 000622, Ballysadare Bay SAC; 000627, Cummeen Strand/Drumcliff Bay (Sligo Bay) SAC; 000671, Tramore Dunes and

Backstrand SAC; 000696, Ballyteige Burrow SAC; 000697 Bannow Bay SAC; 000700, Cahore Polders and Dunes SAC; 000710, Raven Point Nature Reserve SAC; 000729 Buckroney-Brittas Dunes and Fen SAC; 001040, Barley Cove to Ballyrisode Point SAC; 001061, Kilkieran Lake and Castlefreke Dunes SAC; 001090, Ballyness Bay SAC; 001141, Gweedore Bay and Islands SAC; 001257, Dog's Bay SAC; 001309, Omey Island Machair SAC; 001932, Mweelrea/Sheeffry/Erriff Complex SAC; 001957, Boyne Coast and Estuary SAC; 002012, North Inishowen Coast SAC; 002070, Tralee Bay and Magherees Peninsula, West to Cloghane SAC; 002074, Slyne Head Peninsula SAC

Cover photo: Dunes at Banna Strand, Co. Kerry © Aoife Delaney

The NPWS Project Officer for this report was: Karen Gaynor; karen.gaynor@ahg.gov.ie

Irish Wildlife Manuals Series Editors: R. Jeffrey and F. Marnell

Contents

Abbreviations:

SDM = Sand Dunes Monitoring Project (Delaney *et al.*, 2013)

CMP = Coastal Monitoring Project (Ryle *et al.*, 2009)

List of tables

List of Figures

Executive Summary

The Sand Dunes Monitoring Project (SDM) field survey commenced in June 2011 and was completed in August 2012. The main aim of the project was to assess the conservation status of sand dune habitats at a representative sample of sites to inform reporting under Article 17 of the Habitats Directive. The next round of reporting, covering the period 2007-2012, is in 2013.

The National Parks and Wildlife Service (NPWS) selected 40 sites as a representative monitoring sample. Annex I sand dune habitats were recorded from 39 sites. The remaining site (Lough Yganavan, Co. Kerry) was investigated but no Annex I sand dune habitats were found there, so this site is not dealt with in this report. The sites selected contained a substantial proportion of the total national area for each habitat as assessed during the CMP, ranging from 19% for **1220 Perennial vegetation of stony banks** to 95% for **2170 Dunes with creeping willow**.

This project focused on ten Annex I habitats. The number of sites (out of the 39 selected by NPWS) where each Annex I habitat occurred and the total area recorded are shown in Table 1**.**

Table 1: Annex I habitats of Irish sand dunes, the number of sites where they were recorded during the SDM and the total area they occupy in the SDM sites. Priority Annex I habitats are indicated with an asterisk (*).

Annex I habitat	**Number of sites**	**Total area (ha)**
1210 Annual vegetation of drift lines	21	14.12
1220 Perennial vegetation of stony banks	14	2.60
2110 Embryonic shifting dunes	36	90.27
2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)	36	160.26
*2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)	36	3368.04
*2140 Decalcified fixed dunes with *Empetrum nigrum*	1	<0.04
*2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)	4	31.52
2170 Dunes with *Salix repens* ssp. a*rgentea* (*Salicion arenariae*)	14	109.21
2190 Humid dune slacks	29	205.31
*21A0 Machairs	12	1139.56

The conservation assessment methodology described in the Coastal Monitoring Project report was refined to take the specific conditions affecting habitats in Ireland into account. This reduced the requirement for expert judgement in assessing habitats, resulting in a more consistent approach.

The conservation status of each Annex I sand dune habitat present within each site was assessed, with the exception of the two dune heath habitats (2140 and 2150), for which only the area and impacts were noted. The conservation assessment took three parameters into account: Area, Structure and Functions and Future Prospects.

2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)** and ***21A0 Machairs** were assessed as Unfavourable-Bad, while all the rest of the habitats were assessed as Unfavourable-Inadequate. The conservation status of three habitats, **1220 Perennial vegetation of stony banks**, **2170 Dunes with *Salix repens* ssp. *argentea and ***21A0 Machairs**, had not changed since the CMP (their trends remained stable), but the remainder were found to have deteriorating trends, although the conservation status for each of these habitats remained the same. The most frequent reason for deterioration was continued loss of habitat due to anthropogenic activities.

Area was assessed as Favourable for **2170 Dunes with *Salix repens* ssp. *argentea*** and Unfavourable-Inadequate for all the other habitats. Anthropogenic losses noted during the project were related to recreation, development of land for housing, sports pitches, sea defences and water abstraction.

The Structure and Functions of ***21A0 Machairs** were assessed as Unfavourable-Bad, while Structure and Functions were assessed as Unfavourable-Inadequate for the other habitats. Criteria which failed frequently in the Structure and Functions assessments included damage due to disturbance, alterations to the sediment dynamics, bare ground and sward height. Indicators of agricultural improvement caused criteria to fail frequently in the four most landward habitats (***2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)**, **2170 Dunes with *Salix repens* ssp. a*rgentea* (*Salicion arenariae*), 2190 Humid dune slacks** and ***21A0 Machairs)**.

The Future Prospects of two habitats, ***2130 Fixed dunes (grey dunes)** and ***21A0 Machairs** were assessed as Unfavourable-Bad. The remaining habitats were assessed as Unfavourable-Inadequate. The most frequently recorded impacts were associated with grazing (both appropriate and inappropriate regimes), recreation, sea defences and encroachment by scrub, bracken and non-native species. The effects of rabbit grazing were also important, being positive, neutral or negative depending on the situation and rabbit population density.

Although the assessment showed that Annex I habitats of sand dunes in Ireland are in unfavourable condition, many of the challenges faced by these habitats can be addressed with improved management. Many sites would benefit from improved grazing regimes and a more structured approach to recreational use of dunes. Encroachment by non-native species, in particular conifers and

Hippophae rhamnoides, would require more targeted measures. In some cases, coastal constructions and housing developments have resulted in permanent damage to sand dune habitats. The extent and effects of water abstraction on **2190 Humid dune slacks** and ***21A0 Machairs** are not fully understood.

Acknowledgements

We are grateful for the contributions of Kristi Leyden, Kieran Connolly, Melinda Swann, Anne Murray, Katharine Duff and George Smith in the field and for their comments regarding habitats and methodology. Rachel Kavanagh and Rachel Merne provided invaluable support during the field seasons. Thank you also to Orla Daly, Caoimhe Muldoon, Fionnuala O'Neill, Roisin Nash and Philip Perrin for their assistance in the production of this report. Regional staff at NPWS gave background information on sites which was much appreciated. Finally, we would like to thank Karen Gaynor, Naomi Kingston and Deirdre Lynn who have been ready to answer questions and provide guidance and data.

1 Introduction

1.1 The Habitats Directive

The Habitats Directive was adopted in 1992 with the aim of conserving wild flora, fauna and habitats and to maintain biodiversity within EU member states. Annex I habitats are habitats of European importance which are listed under Annex I of the EU Habitats Directive (92/43/EEC). Under the Directive, Ireland is obliged to report on the conservation status of Annex I habitats that occur within its boundaries, and has committed to conserving these habitats (NPWS, 2008). The conservation status of Annex I habitats is reported to the European Commission every six years under Article 17 of the Directive. The next round of reporting, covering the period 2007-2012, will be in 2013.

1.2 Rationale and context of the project

The Coastal Monitoring Project (CMP) was a comprehensive national survey of all known sand dune sites in Ireland. It was carried out between 2004 and 2006, and identified 181 sand dune sites of which all but four were visited (Ryle *et al.*, 2009). The results provided the basis for the first assessment of Annex I sand dune habitats in Ireland under Article 17 of the Habitats Directive (NPWS, 2008). The assessment criteria were derived primarily from the JNCC guidelines developed for use in the UK (JNCC, 2004a), with some modifications for Irish conditions. This baseline report highlighted six Annex I sand dune habitats that were not clearly defined in an Irish context, and suggested that further research be carried out with a view to modifying the definitions and assessment criteria used in future surveys (refer to Ryle *et al.* (2009) for more detail).

The Sand Dunes Monitoring Project (SDM) built on this original baseline survey with the aims of reviewing and modifying the methodology used to collect and analyse conservation assessment data, and assessing the conservation status of Irish Annex I sand dune habitats, thereby helping to fulfil the reporting requirements for 2013. The SDM field survey commenced in June 2011 and was completed in August 2012. A total of 40 sites were selected by the National Parks and Wildlife Service (NPWS), to be used as a representative monitoring sample. The conservation status of each Annex I sand dune habitat present within each site was assessed, with the exception of the two dune heath habitats. Annex I sand dune habitats were recorded at 39 sites. The remaining site (Lough Yganavan, Co. Kerry) was investigated but no Annex I sand dune habitats were found there, so it is not addressed in this report. This report presents the refined assessment protocol developed in response to recommendations made in the CMP, as well as the results of the conservation assessments carried out in 2011/2012. It also makes recommendations for future monitoring work on Annex I sand dune habitats.

1.3 Assessment of Annex I habitats

Annex I habitats are assessed on the basis of their Range, Area, Structure and Functions, and Future Prospects. An evaluation matrix for assessing the conservation status of Annex I habitats using these four parameters is presented by Evans and Arvela (2011). A modified version of this matrix is given in Table 1.1. Each of the aforementioned parameters can receive a score of "Favourable" (green), "Unfavourable-Inadequate" (amber), or "Unfavourable-Bad" (red). "Favourable" is used when the habitat can be expected to prosper without any change to existing management or policies. "Unfavourable-Inadequate" is used in situations where a change in management or policy is required to allow the habitat to prosper, but the danger of extinction is not high. "Unfavourable-Bad" is used when the habitat is in danger of disappearance. Annex I habitats should be managed to attain and maintain "Favourable" conservation status within their range in each Member State (NPWS, 2008).

Table 1.1: Summary matrix of the parameters and conditions required to assess the conservation status of habitats. Modified from Evans and Arvela (2011).

Parameter	Green	Amber	Red
Range	Stable/increasing	>0% - <1% decline/year	≥1% decline in range/year over specified period
Area	Stable/increasing	>0% - <1% decline/year	≥1% decline in area/year over specified period
Structure and Functions	Habitat structure in good condition and functioning normally; typical species present	Any combination other than those described under green or red	>25% of habitat has structure, function or species composition in unfavourable condition
Future Prospects	Excellent, no significant impact from threats expected. Long-term viability assured	Between green and red	Bad, severe impact from threats expected; habitat expected to decline or disappear
Overall assessment of conservation status	All green	One or more amber but no red	One or more red

The guidance provided in Evans and Arvela (2011) relates to the national conservation assessments of Annex I habitats. Annex I sand dune habitats can also be assessed at a site level using a similar approach, based on the parameters Area, Structure and Functions and Future Prospects. For example, a habitat on a particular site which has experienced no loss of area between this monitoring survey and the CMP (Ryle *et al.*, 2009) is assessed as Favourable for that parameter. If the area has decreased by less than 1% per year since the previous assessment, the Area parameter is assessed as Unfavourable-Inadequate and if it has decreased by more than that, it is assessed as Unfavourable-

Bad. The Structure and Functions of the habitat are assessed using habitat-specific criteria (see methodology). The last parameter, Future Prospects, is assessed on the basis of the current and foreseeable effects of impacts and activities on the habitat at the individual site level. As with the national assessment, the overall conservation status of the habitat for each site is determined by the least positive score of the three parameters.

1.4 Annex I sand dune habitats in Ireland

Sand dune habitats occur in complex, dynamic systems, where hostile environmental conditions, such as unstable substrate and exposure to wind and salt spray, can result in the presence of specialised plant species and unique vegetation communities (JNCC, 2004a). The ecology and geomorphology of sand dunes are also heavily influenced by past and current human activities including grazing, the introduction of rabbits, crop growing, military use, recreation and coastal defences (Dargie, 1995).

Sand dune systems in Ireland have developed over the last 5,000 years and are primarily derived from offshore glacial sediments that have been reworked by tides and wind. There has been no widespread development of new dunes since the depletion of these offshore sediments, with current growth restricted to the local reworking of existing sediments (Gaynor, 2008). When discussing succession and the vegetation communities of sand dune habitats it is important to realise that the physical components (e.g. edaphic factors, hydrology, climate) and biological components (i.e. plant species) are directly linked to each other and the interactions between them help drive succession (Quigley, 1991).

Most sand dune systems provide good examples of the different stages of succession, from strandline to mobile dune to fixed dune (Figure 1.1). Drift material and gravel along the high tide mark contains nitrogenous organic matter and offer some shelter, which allows seeds of certain plants to germinate and form strandline vegetation. Small patches of sand begin to accumulate around these strandline plants and drift material, and salt- and drought-tolerant species, such as *Elytrigia juncea* and *Leymus arenarius,* begin to colonise. These species impede airborne sand resulting in the initiation of embryonic dune formation. Embryonic shifting dunes are transient in nature, either being removed by storms or replaced by the next phase of succession (JNCC, 2004a; Gaynor, 2008). In the latter case, the dunes continue to accumulate and grow with fresh sand deposits. As the sand is elevated above the normal tide levels it becomes less salty and conditions become suitable for *Ammophila arenaria* (marram grass) to colonise (Ryle *et al.*, 2009). Marram dunes, so named due to the dominance of *Ammophila arenaria*, are located just out of reach of the highest tide but where there is still active sand movement. *Ammophila arenaria* is the main dune building species and can keep pace with up to 1 m of fresh sand deposition per annum. By trapping sand and binding the dune together, *Ammophila arenaria* allows dunes to build up to a considerable height (Dargie, 1993). Conditions are still too

hostile for the majority of plants on the seaward side, but the landward side offers a more sheltered environment where sand deposition is lower. More plants are able to colonise this side of the marram dunes, and plant diversity begins to increase, with small grasses, annual and perennial herbs and mosses colonising (Dargie, 1993; Ryle *et al.*, 2009). The presence of mosses, and subsequently lichens, helps to stabilise the sand and soil formation begins. When the vegetation has developed to the extent that it forms a more or less complete cover of the substrate, the dunes have essentially become 'fixed' and are now referred to as fixed dunes. The next phase of succession depends on several factors including soil pH and grazing regimes (Dargie, 1993). If the dunes are grazed and the sand has a high calcium content, dune grassland develops. If leaching of the sand occurs, or if the sand is siliceous, dune heath can develop. Where grazing is excluded, dune scrub may develop, which in turn is succeeded by semi-natural woodland. This phase of succession is rarely reached in Ireland (Gaynor, 2008; Ryle *et al.*, 2009). Humid dune slacks can develop in the hollows between dune ridges, where the water table is close to the surface and ground water inundation is frequent. Machair develops when the dune system is eroded by wind down to a level just above the water table. This prevents further erosion and results in the formation of a flat, sandy plain (Gaynor, 2006). In order to be classified as machair, however, several other criteria must be met (see section 1.4.10 ***21A0 Machairs** for details). Early succession of sand dune habitats is usually interrupted due to natural processes which cause destabilisation and erosion, reflecting the dynamic nature of the system (JNCC, 2004a). Human activities such as agriculture (in particular grazing) have tended to prevent succession to scrub and woodland in Ireland (Curtis, 1991).

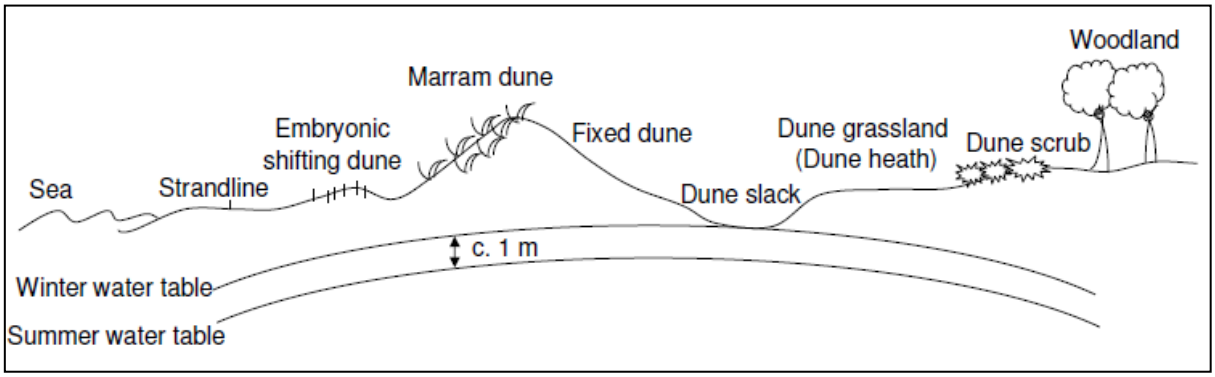

Figure 1.1: A typical dune system profile, identifying the main stages of succession.

As well as the traditional land management practices that have helped to shape our coastline, dune systems are subject to human interference from development for tourism, industry and urbanisation, among other uses. These pressures have resulted in loss of habitat and impairment of habitat functioning across Europe (Heslenfeld *et al.*, 2008). In acknowledgement of the continued threats to the coastal zone, a range of sand dune habitats are included on Annex I of the Habitats Directive (92/43/EEC).

Ten Annex I habitats occur within sand dune systems in Ireland:

1210 Annual vegetation of drift lines

1220 Perennial vegetation of stony banks

2110 Embryonic shifting dunes

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

***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 arenariae*)

2190 Humid dune slacks

***21A0 Machairs**

The four habitats with an asterisk are priority habitats, i.e. habitats whose range is mainly within the EU and which are at risk of disappearing (Commission of the European Communities, 2007). Of the ten habitats listed, eight are exclusively sand dune habitats while two, **1210 Annual vegetation of drift lines** and **1220 Perennial vegetation of stony banks**, are also found in the absence of dune systems. Each habitat is described in more detail below.

1.4.1 1210 Annual vegetation of drift lines

This type of vegetation occurs on sandy, shingle or stony substrate at the upper part of the strand, around the high tide mark. Water-borne material including organic matter is deposited on the shore and provides nutrients and a seed source. The vegetation predominantly consists of annual species, such as *Atriplex* species, *Cakile maritima* and *Salsola kali* (JNCC, 2004a), which are highly specialised to deal with the harsh conditions of high salinity, wind exposure and drought (NPWS, 2008). This habitat is generally very species-poor, fragmented and tends not to occupy large areas due to its narrow, linear nature (Dargie, 1995). It exists in a state of instability and may be absent in some years due to natural and/or anthropogenic causes (JNCC, 2004a).

The habitat description of **1210 Annual vegetation of drift lines** provided by the European Commission changed in the years between the CMP and the SDM. When the CMP was carried out, this habitat was defined as occurring on sand or shingle substrate (Ryle *et al*., 2009). In contrast, the 2007 Interpretation Manual of European Union Habitats states that gravel or shingle should provide at least part of the substrate for **1210 Annual vegetation of drift lines** and if the substrate is entirely sandy, this type of vegetation should be considered under **2110 Embryonic shifting dunes** where

appropriate (Commission of the European Communities, 2007). Following consultation with staff at NPWS, it was not considered appropriate to alter the interpretation of the habitat in an Irish context. During the SDM, any vegetation occurring around the high tide mark, dominated by broadleaved herbs and associated with organic drift line deposits was considered here, even if it occurred only on sandy substrate. This is consistent with the approach taken during the baseline survey (Ryle *et al.*, 2009). Figure 1.2 shows **1210 Annual vegetation of drift lines** growing at site 2 Baltray, Co. Louth.

Figure 1.2: 1210 Annual vegetation of drift lines at site 2 Baltray, Co Louth.

1.4.2 1220 Perennial vegetation of stony banks

This habitat occurs on shingle beaches (cobbles and pebbles) at and above the high tide mark. Similar to **1210 Annual vegetation of drift lines**, it is an unstable habitat that can move from year to year and is affected by stormy weather. Beach fringing vegetation is a relatively species-poor and particularly unstable version of this habitat (Moore and Wilson, 1999). It tends to be dominated by perennial species, typically including *Honckenya peploides*, *Rumex crispus*, *Beta vulgaris* ssp. *maritima*, *Crithmum maritimum* and *Tripleurospermum maritimum*. The rare plants *Crambe maritima* and *Mertensia maritima* are also associated with this community (Fossitt, 2000). Species diversity is determined by the degree of exposure and by substrate stability, coarseness and particle size (Moore and Wilson, 1999; NPWS, 2008). Figure 1.3 shows **1220 Perennial vegetation of stony banks** at site 133 Strandhill, Co. Sligo.

Figure 1.3: 1220 Perennial vegetation of stony banks at site 133 Strandhill, Co. Sligo.

1.4.3 2110 Embryonic shifting dunes

Embryonic shifting dunes are low sand mounds (generally less than a metre high) found between the high tide mark and **2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)**. They are unstable habitats that occur where wind-blown sand is common and they are still vulnerable to saltwater intrusion (Radley, 1994). They represent the initial phase of dune formation and are largely unvegetated (Fossitt, 2000). They typically form where sand gathers around salt-tolerant species such as *Leymus arenarius* and *Elytrigia juncea.* Other plants such as *Cakile maritima, Honckenya peploides* and *Salsola kali* may also occur and *Ammophila arenaria* is generally absent (Fossitt, 2000). They can be very short-lived habitats, which are subject to natural erosion processes and are susceptible to removal by storms or high tides. Figure 1.4 shows **2110 Embryonic shifting dunes** at site 70 Inch.

Figure 1.4: 2110 Embryonic shifting dunes at site 70 Inch, Co. Kerry.

1.4.4 2120 Shifting dunes along the shoreline with Ammophila arenaria *(white dunes)*

These dunes are partially stabilised and are dominated by *Ammophila arenaria*. They are taller than the **2110 Embryonic shifting dunes**, sometimes reaching heights of 15-20 m, and are located further inland (Fossitt, 2000). The dunes are actively created by *Ammophila arenaria* which traps sand, and the accumulation of sand stimulates further growth of *Ammophila arenaria* (NPWS, 2008). Vegetation cover is incomplete and bare sand between the *Ammophila arenaria* tussocks can be colonised by species such as *Carex arenaria, Euphorbia paralias, Eryngium maritimum* and various yellow-flowered Asteraceae species (NPWS, 2008; Fossitt, 2000). Figure 1.5 shows **2120 Shifting dunes along the shoreline with *Ammophila arenaria*** at site 160 Dooey, Co. Donegal.

Figure 1.5: 2120 Shifting dunes along the shoreline with *Ammophila arenaria* at site 160 Dooey, Co. Donegal.

*1.4.5 *2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)*

Figure 1.6: *2130 Fixed coastal dunes with herbaceous vegetation (grey dunes) at site 68 Rossbehy, Co. Kerry.

Figure 1.6 shows ***2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)** at site 68 Rossbehy, Co. Kerry. This is one of four priority Annex I habitats occurring in sand dune systems in Ireland. The boundary between **2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)** and **2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)** can be diffuse, but in general grey dunes are more stable and sheltered than white dunes and sand mobility is greatly reduced, resulting in decreased abundance and vigour of *Ammophila arenaria* (Gaynor, 2008). The sandy substrate is frequently overlain by a layer of humus, there is a more or less closed carpet of vegetation and lichens and mosses are often abundant (Fossitt, 2000). Species diversity and composition varies, but usually fixed dune vegetation is typical of herb-rich grassland. Species such as *Festuca rubra*, *Agrostis* spp., *Achillea millefolium*, *Lotus corniculatus*, *Anthyllis vulneraria*, *Plantago lanceolata*, *Euphrasia* spp., *Thymus polytrichus* and *Galium verum* are common (Fossitt, 2000). It can be an important habitat for orchids such as *Anacamptis pyramidalis* and *Ophrys apifera* (NPWS, 2008). Consolidated and flattened dune areas behind the main dune ridges are also included as fixed dune, unless they conform to ***21A0 Machairs**, which are described below.

Between the mobile and fixed dunes there is a zone of vegetation that is more open than fixed dune vegetation, but is more species-rich than mobile dunes. Yellow composites, *Linum catharticum* and bryophytes such as *Syntrichia* spp. can be frequent here, as well as grasses such as *Ammophila arenaria* and *Festuca rubra*. This semi-fixed, transitional zone is considered part of the fixed dune habitat for the purposes of this survey, for both mapping and assessment purposes.

1.4.6 *2140 Decalcified fixed dunes with Empetrum nigrum

These dunes are similar to ***2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)** in that sand mobility has decreased/ceased and some soil development is evident. This priority habitat is extremely rare in Ireland, probably due to the long history of grazing on Irish sand dune systems and also due to the highly calcareous nature of many of Ireland's sand dune systems (Gaynor, 2008). It develops when heath species colonise decalcified fixed dunes (Fossitt, 2000), with the substrate becoming more acidic due to leaching of calcium over time (NPWS, 2008). This habitat is characterised by *Empetrum nigrum*, in conjunction with *Calluna vulgaris, Erica tetralix, Ulex* spp. and *Carex arenaria*. Lack of grazing plays an important role in the development and maintenance of this habitat (Gaynor, 2008). Figure 1.7 shows ***2140 Decalcified fixed dunes with *Empetrum nigrum*** at site 148 Sheskinmore, Co. Donegal.

Figure 1.7: *2140 Decalcified fixed dunes with *Empetrum nigrum* at site 148 Sheskinmore, Co. Donegal.

1.4.7 *2150 Atlantic decalcified fixed dunes (Calluno-Ulicetea)

The second heath-dominated dune community is also a priority habitat. Again, it is found in dune systems where the substrate has become decalcified or acidified. The species present within this habitat are almost identical to those present in ***2140 Decalcified fixed dunes with *Empetrum nigrum*,** but *Empetrum nigrum* is absent (NPWS, 2008). In fact, the distinction between the two habitats is very weak (Gaynor, 2008). *Calluna vulgaris, Erica* spp., *Ulex* spp. and *Carex arenaria* are typical, and lichens, especially *Cladonia* spp., can be locally abundant (NPWS, 2008). This habitat often forms a mosaic with fixed dune vegetation communities, and although the presence of dwarf shrubs is the most

distinguishing feature (Gaynor, 2008), they usually have a low cover (JNCC, 2004b). As with ***2140 Decalcified fixed dunes with *Empetrum nigrum***, it is extremely rare, with only a few known sites in Ireland (Gaynor, 2008; NPWS, 2008). Figure 1.8 shows ***2150 Atlantic decalcified fixed dunes (*Calluno-ulicetea*)** at site 147 Maghera, Co. Donegal.

Figure 1.8: *2150 Atlantic decalcified fixed dunes (Calluno-ulicetea) at site 147 Maghera, Co. Donegal.

1.4.8 2170 Dunes with Salix repens *ssp.* argentea (Salicion arenariae)

Figure 1.9: 2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) at site 148 Sheskinmore, Co. Donegal.

Figure 1.9 shows **2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)** at site 148 Sheskinmore, Co. Donegal. The distinction between this habitat and **2190 Humid dune slacks** is very difficult to determine as the two are closely associated (Gaynor, 2008), and often form a complex mosaic with each other and with fixed dunes (Ryle *et al.*, 2009). This habitat is typically found either on sandy hummocks within dune slacks, or on the sides of dune ridges adjacent to slacks. In order to be classified as **2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)**, the area in question should be beyond the influence of the water table, either through elevation of the surface of the ground (NPWS, 2008) or by a lowering of the water table (Gaynor, 2008). It is characterised by dominance of *Salix repens*, which often forms a dense ground cover. Moisture-loving plant species typically associated with dune slacks should be absent or noticeably reduced (NPWS, 2008). Other

species associated with this habitat include *Holcus lanatus*, *Carex flacca* and *Carex arenaria*, *Agrostis stolonifera*, *Ononis repens* and *Lotus corniculatus* (Ryle *et al*. 2009; NPWS 2008; Fossitt, 2000).

1.4.9 2190 Humid dune slacks

Figure 1.10 shows **2190 Humid dune slacks** at site 162 Rinclevan, Co. Donegal, in summer and flooded in late spring. Dune slacks are topographically the lowest lying regions within a dune system, found in hollows or depressions either behind or between dune ridges (Fossitt, 2000). The waterlogged condition of the soil is an important determinant of the vegetation; the water table is usually within 1 m of the surface, with diurnal, seasonal and annual fluctuations (Devaney, 2007). **2190 Humid dune slacks** can remain flooded from two to six months annually, with fluctuations in the water table based on precipitation and evapotranspiration. They can be classified as either primary or secondary depending on how they are formed. Primary slacks are formed by rapidly advancing dune ridges cutting off former beach plains from the influence of the sea, while secondary slacks are formed by localised erosion in older dunes. In each case, the wind erodes the bare sand until the groundwater level is reached and pioneer dune slack vegetation begins to colonise (Boorman *et al.*, 1997). They are floristically rich and support wetland communities. Typical species include *Juncus* spp., *Carex* spp., *Hydrocotyle vulgaris, Mentha aquatica, Agrostis stolonifera, Potentilla anserina, Anagallis tenella* and orchids such as *Epipactis palustris, Dactylorhiza* spp. and *Neottia ovata* (NPWS, 2008; Devaney, 2007; Fossitt, 2000). Soil formation is more advanced within dune slacks than in the preceding habitats, and they are more nutrient enriched due to leaching from the surrounding dunes (Devaney, 2007).

Figure 1.10: 2190 Humid dune slacks at site 162 Rinclevan, Co. Donegal, in summer (dry) and in spring (flooded).

Over time, dune slacks can dry out as sand is dumped in the slack, raising the surface level of the ground (NPWS, 2008) or because of lowering of the water table (Gaynor, 2008). As a result, dune slacks have a number of vegetation communities demonstrating all phases of succession within them, from pioneer to dry mature slacks. When a dune slack has dried to the point where it is no longer directly influenced by groundwater, the habitat undergoes succession to **2170 Dunes with *Salix***

***repens* ssp. *argentea* (*Salicion arenariae*)** or **2130 Fixed dunes with herbaceous vegetation (grey dunes).** Once this has happened, although the habitat retains its characteristic dune slack morphology, it is no longer considered to correspond to **2190 Humid Dune slacks** for the purposes of conservation assessment.

*1.4.10 *21A0 Machairs*

***21A0 Machairs**, constituting the fourth priority sand dune habitat, are complex, dynamic systems which are considered natural landforms that are the product of both wind erosion and cultural activities (Gaynor, 2006). They are globally restricted to the northwest coasts of Ireland and Scotland (NPWS, 2008). There are a number of criteria which must be met before an area can be classified as ***21A0 Machairs**. A machair should typically be a flat, sandy, coastal plain, in an oceanic location with a cool, moist climate. The sandy substrate should have a significant percentage of shell-derived material, producing lime-rich soil with a pH normally greater than 7 (NPWS, 2008). The vegetation should be herb-rich, with a low frequency of sand-binding species (Curtis, 1991). Wetness of the soil varies, due to the proximity of the water table, with much of the vegetation transitional between wet and dry communities (Gaynor, 2006). There should be a history of human interference, principally from grazing, and in some cases rotational cropping (JNCC, 2004a), although crops are far more typical of the habitat in Scotland and arable land is rare in Irish machair.

This habitat is found in exposed locations between Galway Bay and Malin Head, Co. Donegal (Curtis, 1991). Frequent species include *Festuca rubra*, *Lotus corniculatus, Plantago lanceolata, Bellis perennis, Carex arenaria, Galium verum* and *Trifolium repens.* There is, however, no suite of species unique to machair (Gaynor, 2006; Fossitt, 2000). Figure 1.11 shows ***21A0 Machairs** at site 120 Doo Lough, Co. Mayo.

Figure 1.11: *21A0 Machairs at site 120 Doo Lough, Co. Mayo.

1.5 Nomenclature of the Annex I habitats

The nomenclature of the ten Annex I sand dune habitats described above follows the Interpretation Manual of European Union habitats (Commission of the European Communities, 2007). There is an abbreviated version of some of the habitat names used in The Status of the EU Protected Habitats and Species in Ireland (NPWS, 2008). These abbreviations have been adopted for the remainder of this document so that **2120 Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)** are referred to as **2120 Marram dunes (white dunes)**, ***2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)** are referred to as ***2130 Fixed dunes (grey dunes)**, and **2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)** are referred to as **2170 Dunes with creeping willow**.

2 Methodology

The primary focus of this project was to assess the conservation status of eight Annex I sand dune habitats in Ireland at a representative sample of sand dune sites. Habitat assessments were carried out for **1210 Annual vegetation of drift lines**, **1220 Perennial vegetation of stony banks**, **2110 Embryonic shifting dunes**, **2120 Marram dunes (white dunes)**, ***2130 Fixed dunes (grey dunes)**, **2170 Dunes with creeping willow**, **2190 Humid dune slacks** and ***21A0 Machairs**. Information regarding area and impacts that were relevant to the conservation assessment of ***2140 Decalcified dunes with *Empetrum nigrum*** and ***2150 Atlantic decalcified dunes (*Calluno-Ulicetea*)** were also recorded, but no assessment was carried out. The conservation assessment methodology was designed to complement the EU guidelines on assessing conservation status under Article 17 of the Habitats Directive (Evans and Arvela, 2011).

2.1 Site Selection

A sample of 40 sand dune sites was selected by NPWS from the 181 sites identified during the Coastal Monitoring Project (CMP) (Ryle *et al.*, 2009). The sites were chosen to be representative of the range of habitat types and geographic locations of sand dune systems in Ireland and they contained a substantial proportion of the total national area for each habitat as assessed during the CMP, ranging from 19% for **1220 Perennial vegetation of stony banks** to 95% for **2170 Dunes with creeping willow** (Table 2.1).

Table 2.1: Area of Annex I sand dune habitats recorded during the CMP within all CMP sites and within the sites selected for survey during the SDM, and the proportion of each habitat accounted for by the sites selected for sample during the SDM.

Annex I habitat	**Total habitat area (ha) (*n=181*)**	**Area in the sample sites (ha) (*n=39*)**	**Proportion in the sample sites (%)**
1210 Annual vegetation of drift lines	53.15	21.32	40.1
1220 Perennial vegetation of stony banks	31.40	5.96	19.0
2110 Embryonic shifting dunes	171.39	62.24	36.3
2120 Marram dunes (white dunes)	405.75	231.44	57.0
*2130 Fixed dunes (grey dunes)	7058.32	3296.31	46.7
*2140 Decalcified *Empetrum* dunes	1.73	1.26	72.8
*2150 Decalcified dune heath	77.78	66.73	85.8
2170 Dunes with creeping willow	103.59	97.97	94.6
2190 Humid dune slacks	212.25	159.23	75.0
*21A0 Machairs	2743.16	932.14	34.0

Table 2.2 shows the sites visited in 2011/2012, the counties where they are located and Special Areas of Conservation (SACs) with which they coincide. One site, Lough Yganavan, was listed in Ryle *et al.* (2009), but no sand dune habitats were mapped there when it was visited during the SDM. Field work was carried out in July to September 2011 (30 sites) and May to August 2012 (10 sites).

Table 2.2: Sites surveyed during the SDM, their counties and SAC(s) with which they coincide.

SDM site no.	Site name	County	SAC no.	SAC name	Survey year
2	Baltray	Louth	001957	Boyne Coast And Estuary	2011
3	Mornington	Meath	001957	Boyne Coast And Estuary	2011
9	Portmarnock	Dublin	000199	Baldoyle Bay	2011
10	North Bull	Dublin	000206	North Dublin Bay	2011
11	South Bull	Dublin	000206	North Dublin Bay	2011
17	Brittas Bay	Wicklow	000729	Buckroney-Brittas Dunes And Fen	2011
18	Mizen Head	Wicklow	000729	Buckroney-Brittas Dunes And Fen	2011
28	Cahore point	Wexford	000700	Cahore Polders And Dunes	2011
35	The Raven	Wexford	000710	Raven Point Nature Reserve	2011
41	Ballyteige Burrow	Wexford	000696	Ballyteige Burrow	2012
43	Grange	Wexford	000697	Bannow Bay	2011
46	Tramore	Waterford	000671	Tramore Dunes And Backstrand	2012
58	Inchydoney	Cork	000091	Clonakilty Bay	2011
60	Castlefreke	Cork	001061	Kilkeran Lake And Castlefreke Dunes	2011
64	Barley Cove	Cork	001040	Barley Cove To Ballyrisode Point	2011
68	Rosbehy	Kerry	000343	Castlemaine Harbour	2011
70	Inch	Kerry	000343	Castlemaine Harbour	2012
75	Castlegregory	Kerry	002070	Tralee Bay And Magharees Peninsula, West To Cloghane	2011
77	Banna Strand	Kerry	000332	Akeragh, Banna And Barrow Harbour	2011
87	Fanore	Clare	000020	Black Head-Poulsallagh Complex	2011
97	Dog's Bay	Galway	001257	Dog's Bay	2011
100	Aillebrack	Galway	002074	Slyne Head Peninsula	2011
101	Doonloughan	Galway	002074	Slyne Head Peninsula	2011
104	Omey Island	Galway	001309	Omey Island Machair	2011
108	Dooaghtry	Mayo	001932	Mweelrea/Sheeffry/Erriff Complex	2012
120	Doo Lough	Mayo	000470	Mullet/Blacksod Bay Complex	2011
124	Aghleam	Mayo	000470	Mullet/Blacksod Bay Complex	2012
128	Garter Hill	Mayo	000500	Glenamoy Bog Complex	2011
131	Bartragh Island	Mayo	000458	Killala Bay/Moy Estuary	2011
†133	Strandhill	Sligo	000627	Cummeen Strand/Drumcliff Bay (Sligo Bay)	2011
†133	Strandhill	Sligo	000622	Ballysadare Bay	2011
147	Maghera	Donegal	000190	Slieve Tooey/Tormore Island/Loughros Beg Bay	2012
148	Sheskinmore	Donegal	000197	West Of Ardara/Maas Road	2012
155	Kincaslough	Donegal	001141	Gweedore Bay And Islands	2011
157	Derrybeg	Donegal	001141	Gweedore Bay And Islands	2011
160	Dooey	Donegal	001090	Ballyness Bay	2011
162	Rinclevan	Donegal	000147	Horn Head And Rinclevan	2011

SDM site no.	Site name	County	SAC no.	SAC name	Survey year
167	Tranarossan	Donegal	000194	Tranarossan And Melmore Lough	2012
169	Lough Nagreany	Donegal	000164	Lough Nagreany Dunes	2012
175	Crummies Bay	Donegal	002012	North Inishowen Coast	2012
	Lough Yganavan	Kerry	000370	Lough Yganavan and Lough Nambrackdarrig	2011

†Strandhill overlaps with two separate SACs (000627 Cummeen Strand/Drumcliff Bay (Sligo Bay) and 000622 Ballysadare Bay).

2.2 Equipment

Surveyors used digital and printed baseline maps derived from the maps generated during the CMP (Ryle *et al*., 2009). The digital maps were provided as part of a GIS project (using ArcPad software) that was loaded onto mobile mappers for use in the field. The ArcPad project included specially designed waypoint shapefiles that allowed geographic data to be recorded in the field. Digital spreadsheets, also loaded onto the mobile mappers, were provided for recording information relating to the Structure and Functions and Future Prospects of the site. The spreadsheets were also printed onto waterproof paper to allow work to continue in the event of a technical failure. A sheet for recording general site-related information was provided.

A health and safety form was provided to be filled in each day. Each ecologist also carried a digital camera, a compass, a Garmin GPS, a 2 m x 2 m string relevé, a tape measure, a first-aid kit, a mobile phone and a high-visibility vest.

2.3 Area

Area was assessed by comparing the habitat areas recorded in the field in 2011/2012 (SDM) to the areas that were present during the baseline survey (CMP). The process can be divided into three main stages: field survey, digitising and calculating the change since the CMP.

2.3.1 Field survey

Two methodologies were employed to map the area of Annex I sand dune habitats. Frontal dune habitats such as **1210 Annual vegetation of drift lines**, **1220 Perennial vegetation of stony banks**, **2110 Embryonic shifting dunes** and **2120 Marram dunes (white dunes)** tend to be narrow and linear and the boundaries of these habitats were mapped using transects. Transects perpendicular to the coastline were recorded at regular intervals along the foreshore and transitions between habitats along the transects were marked with waypoints on the mobile mappers. As well as the transects perpendicular to the shore, the start- and end-points of each of these habitats parallel to the shore were marked with a waypoint to aid digitisation and the habitats were also drawn on the field map.

For these frontal dune habitats, the minimum mapping area was 10 m long by 2 m wide to allow for their fragmented, linear nature. The habitats occurring farther inland tend to be less linear, and a different method was found to be more effective. ***2130 Fixed dunes (grey dunes)**, ***2140 *Empetrum nigrum* dunes**, ***2150 Decalcified dune heath**, **2190 Humid dune slacks**, **2170 Dunes with creeping willow** and ***21A0 Machairs** indicated on the baseline maps were visited and the boundaries were checked by walking along them. In addition, the 2005 aerial photographs for each site were examined and specific locations which were likely to contain habitats of interest were visited, even if they were not marked on the baseline maps. For these habitats, a minimum mapping area of 100 m^2 was set.

Occasionally, well-developed habitats were found on sites where they had not previously been recorded. If it was considered extremely unlikely that a habitat had developed since the CMP, it was assumed that the habitat had been omitted erroneously. The 2005 aerial photographs were taken around the period that the CMP was carried out, but were not available to the field workers at the time. In 2011/2012, it was sometimes possible to use the 2005 photographs to confirm that habitats that were not marked on the baseline maps were, in fact, present at the time of the CMP. There are several reasons why a habitat may not have been represented on the baseline maps despite having been present on the site at the time of the CMP. This could occur because (a) the interpretation of a particular habitat has changed, (b) changes to the methodology resulted in more detailed maps in 2011/2012, (c) some locations were simply not visited during the CMP, or (d) errors were made digitising the field maps from the CMP. The baseline maps were later revised to reflect these discrepancies (see section 2.3.2 Digitisation).

Where a habitat mapped in 2011/2012 was believed to represent a genuine change in habitat, this was noted as "change" in the waypoint's attributes. For newly recorded habitats that were present six years ago but not marked on the baseline map, the waypoints were marked "interpretation". Waypoints confirming unchanged boundaries were recorded occasionally to clarify complex boundary alterations or to confirm that each part of the site was visited, and these waypoints were recorded with the label "no change".

Complex habitat mosaics occasionally occurred where the minimum mapping area was too large to allow easy representation of all of the habitats present. To cater for this eventuality, a primary, secondary and tertiary habitat could be entered at each waypoint. The habitat with the most cover within a polygon was called the primary habitat and other habitats were entered as the secondary and tertiary habitats. Features such as scrub, woodland and dense bracken can add structural diversity to sand dune habitats, but they can also indicate lack of grazing or succession. They were

retained within the sand dune habitat maps, but were indicated as secondary habitats using Fossitt codes (e.g. 1° habitat: *2130, 2° habitat: WS1).

Each habitat mapped on the site during the SDM was represented as a closed, labelled polygon on the field map. Mosaic polygons were labelled with the habitat codes of all the habitats within the polygon. Where habitats or boundaries had changed in comparison to the baseline maps, the changes were marked on the field map to facilitate subsequent digital mapping. Polygons which had been altered from the baseline map were also labelled "c" (change) or "i" (interpretation) to indicate whether or not there had been a genuine change since the CMP.

At some sites, the boundaries of a habitat could not be accessed due to the presence of livestock or because permission to access the land could not be obtained. The area was retained in the SDM map but marked as "ns" (not surveyed) if the surveyor could not see the habitat, or "e" (viewed externally) if the surveyor was able to view the habitat from the boundaries.

The site boundary mapped during the CMP did not always correspond to the boundary of the sand dune system. In some cases, this was because part of the system was occupied by a golf course. No attempt was made to determine whether Annex I habitats were present within golf courses during the SDM. Elsewhere, the site boundary sometimes reflected the point where the land use changed. For example, the point where commonage ended and dunes had been enclosed within field boundaries. Where this occurred, the sand dune habitat outside the site boundary was marked on the field map and labelled "not surveyed" or "external" depending on whether the surveyor could view the area in question. If the habitat had naturally moved beyond the previous site boundary due to erosion and accretion, the new boundaries were mapped and surveyed.

Features that occupied an area smaller than the minimum mapping area were recorded with a single waypoint and these included habitats, rare plants and impacts on the site. The locations of monitoring stops and relevés were also recorded with waypoints. Photographs were taken at monitoring stops, relevés and features.

2.3.2 Digitisation

The first step in the digitisation process was to assess and revise the GIS shapefiles produced during the CMP. As discussed above, the changes to habitat boundaries that were labelled "interpretation" were considered to improve the accuracy of the baseline maps rather than indicating genuine changes since the CMP was carried out. The CMP habitat maps (baseline maps) were edited to reflect these changes before any calculation of change in area was made. The resulting maps and areas were called the revised baseline maps or revised CMP maps and revised baseline areas or revised CMP areas.

Areas of bracken and scrub that were recorded as features of Annex I habitats in 2011/2012 were not added to the revised CMP maps as there was only one column for recording the habitat. Habitat mosaics were shown as containing only the dominant habitat. This is consistent with the digitisation carried out during the CMP.

When the revised CMP maps had been completed, a second GIS shapefile was produced with up-to-date habitat maps of all the Annex I sand dune habitats surveyed during the SDM in 2011/2012. Mosaic polygons were digitised with the percentage cover of each of the habitats shown in the attributes table for surveyed areas. Features such as scrub, woodland and dense bracken within Annex I habitats were shown as secondary habitats in the attributes table. Each polygon was labelled to indicate whether it had been fully surveyed ("Surveyed"), surveyed from the boundaries but not accessed directly ("External") or had been totally inaccessible ("Not surveyed").

2.3.3 Calculating change in area

The Area assessment was carried out by subtracting the habitat area recorded on the revised CMP maps from the corresponding areas on the final SDM maps. The difference was expressed as a percentage of the revised CMP area. For each habitat where any change was recorded, the reason for the change was examined. If there was no loss of area, or the change was due to natural processes that affect coastal habitats, the loss of area was not considered to be negative and Area was assessed as Favourable. However, if the loss of area was related to an anthropogenic factor, the habitat was assessed as Unfavourable. If the reduction in area was less than 1% per year since the CMP, Area was assessed as Unfavourable-Inadequate. If it had decreased by more than 1% per year since the CMP, Area was assessed as Unfavourable-Bad. The last year of the CMP field survey was 2006, and all calculations of the percentage of change per year were calculated for the period 2006 to 2012. Increases in area were only taken into account in the Area assessment if they were the result of human activities such as improved management or habitat restoration. Natural increases due to accretion and succession were considered to be neither positive nor negative as they are part of the natural processes affecting sand dunes. The terminology and thresholds used were chosen to be consistent with the guidelines for assessing habitats under the Habitats Directive (Evans and Arvela, 2011). Parts of the site which were not visited ("Not surveyed") are included in the area tables for each habitat, but were excluded from the Area assessment.

2.4 Structure and Functions

Structure and Functions were assessed at two levels: within each Annex I habitat at each site and within the entire area of each Annex I habitat that was present within the sample sites. The resulting information can be used to develop site based management recommendations and contribute to the national conservation assessments of sand dune habitats.

2.4.1 Site-based assessment

The Structure and Functions assessment method employed during the SDM differed from that used during the CMP. During the SDM, monitoring stops contributed to an overall habitat assessment within a site but did not pass or fail individually, whereas, during the CMP, each monitoring stop could be assessed as an individual unit. A number of the monitoring criteria had been designed to be applied across the whole Annex I habitat (JNCC, 2004a), and applying them on an individual stop basis caused the habitats to fail some criteria despite being in good condition. For example, while bare sand is desirable in ***2130 Fixed dunes (grey dunes)**, it will not necessarily be present within every monitoring stop in a healthy habitat. Applying each criterion on a stop basis also made it difficult to allow for structural diversity across a habitat. The focus changed during the SDM to allow some of the criteria to be assessed across the habitat as a whole rather than at each monitoring stop individually. For example, the cover of bare ground was recorded at every stop in ***21A0 Machairs**, but it was assessed on a habitat basis. If no bare ground was present within the habitat, or if the total cover of bare ground was over 5%, the habitat was assessed as Unfavourable.

When assessing a criterion on a habitat-wide basis, the data from all of the monitoring stops and the relevant mapping data contributed to a habitat-scale assessment. Total cover of bare ground, for example, can be extrapolated from the percentage recorded within each monitoring stop or it can be calculated using the mapping information. In some cases, a combination of monitoring stop data and GIS data was used. The mapping of scrub, bracken and disturbed habitat during the field survey allowed accurate calculation of the area of the habitat covered by these features, but the main source of information regarding Structure and Functions remained the monitoring stop.

The number of monitoring stops recorded within each Annex I sand dune habitat was decided in the field after some preliminary field mapping had taken place. Table 2.3 shows how the number of stops recorded increased according to the habitat area. In some cases, the area of a habitat was overestimated or underestimated in the field and more or fewer stops were recorded than were indicated in Table 2.3. A minimum monitoring area of 0.04 ha was established to ensure that habitats

were large enough to function properly and they were not excessively influenced by the adjacent habitats and edge effects.

Table 2.3: The number of monitoring stops recorded in each Annex I sand dune habitat in 2011 and 2012.

Number of monitoring stops recorded	Area of habitat (ha) 2011	Area of habitat (ha) 2012
0	≤0.04	≤0.04
2	>0.04 - 0.25	>0.04 - 0.25
4	>0.25 - 5	>0.25 – 1
8	>5 - 50	>1 – 25
12	>50 - 100	>25 – 100
16	>100	>100

Fewer monitoring stops were recorded in 2011 because relevés were also recorded that year and they required a greater time investment than a monitoring stop. One relevé was recorded within each Annex I habitat at each site surveyed in 2011. The relevés were positioned in areas where the habitats were considered to be in good condition and were functioning well. Within the relevés, all species of bryophyte, macro-lichen and vascular plant were recorded. Relevé data were entered into a Turboveg database which accompanies this report, and they were used later when the positive indicator species for each habitat were refined.

The data recorded at monitoring stops varied depending on the habitat being assessed. Table 2.4 gives a summary of the Structure and Functions assessment criteria and the habitats where each was assessed. The criteria and thresholds were primarily derived from the JNCC assessment guidelines, with alterations to take into account the recommendations regarding positive indicator species made by Ryle *et al.* (2009).

Frequency of positive indicator species, continued presence of rare species, frequency and cover of negative indicator species and frequency of non-native species were assessed for each habitat, as were the degree of disturbance and anthropogenic alteration of sediment availability in the system. Additional criteria were also assessed and these depended on the specific ecological characteristics of the Annex I sand dune habitats. The assessment criteria and target values for each habitat assessed are presented in Appendix I in the form of recording sheets for Structure and Functions assessments.

Positive and negative indicator species were different for each habitat. The threshold values for the frequency of positive and negative indicator species leading to a pass or fail score within a habitat are derived from those stated in the UK Common Standards Monitoring Guidelines (JNCC, 2004a). A minimum number of positive indicator species within a monitoring stop and a maximum Domin value of any negative indicator species within a monitoring stop were introduced during the SDM to ensure that localised degradation within the habitat was reflected in the assessment. A minimum number of positive indicator species within a stop applied to ***2130 Fixed dune (grey dunes)**, **2170 Dunes with creeping willow**, **2190 Humid dune slacks** and ***21A0 Machairs,** while a maximum cover of negative indicator species within a stop applied to all of the habitats assessed.

The target for frequency of positive indicator species indicated in the JNCC guidelines for **1220 Perennial vegetation of stony banks** was developed for large shingle bank systems, while the examples of this habitat found during the SDM were smaller structures associated with beaches. These beach fringing communities are more unstable and less diverse than the communities of larger, more extensive areas of **1220 Perennial vegetation of stony banks** (Moore and Wilson, 1999). To avoid unnecessarily harsh assessments, an alternative, less stringent target was introduced for beach fringing communities, while the original target was retained for use on large shingle banks.

Fewer criteria were assessed at the simple fore-dune habitats, where the exposed conditions and unpalatable vegetation limit the damage done by invasive species and herbivore activity. The more stable, landward habitats are more complex both in their internal ecology (e.g. inter-species competition) and in their relationships with outside influences such as water availability. The Structure and Functions of ***2140 Decalcified *Empetrum* dunes** and ***2150 Decalcified dune heath** were not assessed within this report.

Table 2.4: Criteria assessed as part of the Structure and Functions assessment during the Sand Dunes Monitoring Project and the habitats in which they were applied.

Criterion	Assessment	1210	1220	2110	2120	*2130	2170	2190	*21A0
Positive indicator species	Frequency within the whole habitat	✓	✓	✓	✓	✓	✓	✓	✓
Positive indicator species	Number of species within each monitoring stop					✓	✓	✓	✓
Rare species	Evidence of decline within the habitat since CMP	✓	✓	✓	✓	✓	✓	✓	✓
Cover of bryophytes	Cover within each monitoring stop (*21A0) or frequency within the habitat (2190)							✓	✓
Negative indicator species	Frequency and cover within the whole habitat and cover within each monitoring stop	✓	✓	✓	✓	✓	✓	✓	✓
Non-native invasive species	Frequency within the habitat	✓	✓	✓	✓	✓	✓	✓	✓
Flowering and fruiting of positive indicator species	Frequency within the habitat					✓			✓
Green shoots and flowering in flowering season	Frequency within the habitat			✓	✓				
Height of vegetation	Mean height within the habitat (*21A0) or % of stops that achieve a target range within the habitat (*2130)					✓			✓
Bare ground	Percentage cover within the habitat					✓	✓	✓	✓
Salix repens	Percentage cover within the habitat							✓	
Scrub, tree cover	Frequency of scrub close to monitoring stops and total cover within the habitat					✓	✓	✓	
Proportion of broadleaved herbs	Cover of broadleaved herbaceous species as a percentage of total vegetation cover within each monitoring stop							✓	
Indicators of rank conditions	Percentage cover within the habitat						✓		
Height of *Salix repens*	Height within each stop						✓		
Trees/saplings from adjacent plantations	Frequency of trees/saplings from adjacent plantations within 20 m of monitoring stops					✓			
Interference with sediment dynamics	Evidence of structures or practices which currently interfere the sediment dynamics of the habitat	✓	✓	✓	✓	✓	✓	✓	✓
Damage due to disturbance	Percentage area affected across the whole habitat	✓	✓	✓	✓	✓	✓	✓	✓

When the cover of a species or feature was required for the assessment, it was recorded according to the Domin scale or as percent cover. Where necessary, Domin scores were converted to percentage values during analysis as shown in Table 2.5.

Table 2.5: The Domin scale, the range each point on the scale represents and the associated percentage cover values.

Scale	Range	Mid-range % value
+	A single individual with cover <1%	0.1
1	2-3 individuals with combined cover <1%	0.3
2	Several individuals but <1% cover	0.7
3	1-4% cover	2.0
4	5-10% cover	7.0
5	11-25% cover	18.0
6	26-33% cover	29.5
7	34-50% cover	42.0
8	51-75% cover	68.0
9	76-90% cover	83.0
10	91-100% cover	95.5

When a habitat failed to meet the target values for a criterion at a site, the data, photographs and habitat maps were consulted. If the target values were not achieved for reasons relating to the natural, dynamic processes at work on coastal systems, then the result was overturned on expert judgement and the criterion was allowed to pass. When expert judgement was used in this way, a note was made on the conservation assessment sheet and in the individual site report. After each criterion had been applied and expert judgement was used where appropriate, the number of criteria which failed was noted. If no criteria failed, then the Structure and Functions were assessed as Favourable. If one or two criteria failed, the Structure and Functions were assessed as Unfavourable-Inadequate. If three or more criteria failed, they were assessed as Unfavourable-Bad. Although the number of criteria varies depending on the habitat, the number of failed criteria leading to an Unfavourable assessment is the same for all habitats. Failure to pass three or more criteria indicates that several aspects of the Structure and Functions are impaired, irrespective of how many criteria are assessed.

2.4.2 Habitat-based assessment

As well as assessing the conservation status of Annex I sand dune habitats at individual sites, the conservation status of each habitat across all sites was assessed. In accordance with the EU guidelines for assessing Structure and Functions on a national basis (Evans and Arvela, 2011), this was done by calculating the total area in Favourable and Unfavourable condition within the sample sites. For sites where a habitat was assessed as Favourable, the entire area of that habitat was considered to be in Favourable condition. For sites that were assessed as Unfavourable, the area of the site where the Structure and Functions of the habitat were impaired was calculated from the monitoring stop and GIS data. This part of the site was considered to be Unfavourable, while the remaining area was recorded as Favourable. For example, the ***2130 Fixed dunes (grey dunes**) were assessed as Unfavourable-Inadequate at site 175 Crummies Bay because of excessive scrub cover and rank vegetation. When the GIS and monitoring stops were consulted, they showed that scrub was present at 13% of the habitat, and this exceeds the target of a maximum of 5% scrub cover. Scrub cover was therefore considered to be excessive at 8% of the habitat. Rank vegetation was present in 15% of the habitat. The target for the maximum proportion of the habitat occupied by rank vegetation was 10%, so the target cover of rank vegetation was exceeded by 5%. Adding up the areas of excessive scrub (8%) and rank vegetation (5%), the total proportion of the habitat in Unfavourable condition was equal to 13%, an area of 1.55 ha. In some cases, the same part of the site was affected by several negative factors, and this was taken into account to ensure that the total area in Unfavourable condition was not overestimated.

The area in Favourable and Unfavourable condition of each habitat within the SDM sites was calculated and expressed as a percentage of the total area of the habitat. Structure and Functions were assessed as Favourable if 99-100% of the total habitat area was assessed as being in Favourable condition. If 75-98% of the habitat was in Favourable condition, the habitat was assessed as Unfavourable-Inadequate. If less than 75% of the habitat was in Favourable condition and the remainder was in Unfavourable condition, Structure and Functions were assessed as Unfavourable-Bad. Parts of the habitat which could not be accessed during the field survey were excluded from the Structure and Functions assessment.

A worked example of the conservation assessment for **2170 Dunes with creeping willow** is given in Appendix II.

The methodology described above is the definitive methodology which was finalised after fieldwork in 2011. Refinement of the methodology was undertaken in 2011 in response to unresolved habitat characterisations identified during the CMP (Ryle *et al*., 2009). For most of the assessment criteria, the changes in the finalised methodology only affected how the data were

processed, and changes in how data were recorded in the field were not required. The assessments presented here and the data in the MS Access database that accompanies this report were all produced according to the finalised methodology with two exceptions. The percentage of the vegetation flowering and fruiting in ***2130 Fixed dunes (grey dunes)** was not recorded from monitoring stops in 2011, and was assessed later from photographs. Similarly, the total bryophyte cover within each stop in **2190 Humid dune slacks** was not recorded in 2011, but was assessed later on the basis of photographs and species data recorded at monitoring stops. For these criteria in these two habitats, only the pass or fail rate on a site basis is shown in the database.

During 2011, the DAFOR scale was used to record the cover scores at some sites, but this method was changed as Domin provides more detailed information. An explanation of the DAFOR scale following the guidelines recommended by the BSBI for recording flora is presented in Appendix III along with details of how DAFOR categories were converted to percent cover when calculating the total cover of species and features.

The criteria and thresholds for the Structure and Functions assessment for each Annex I sand dune habitat were primarily derived from the JNCC assessment guidelines, with alterations to take into account the recommendations regarding positive indicator species made by Ryle *et al*. (2009). Additional sources of information used when the methodology was being refined included the monitoring stops and relevés carried out during the SDM in 2011, relevé information gathered by Gaynor (2008), the shingle beach survey (Moore and Wilson, 1999) and the Biomar survey of Irish machair (Crawford *et al*., 1996). Differences between Structure and Functions criteria used during the CMP and the SDM are shown in Appendix IV. Refer to the JNCC assessment guidelines (JNCC, 2004a) for background information on the various assessment criteria and thresholds used for the Structure and Functions assessment for each Annex I sand dune habitat.

2.5 Future Prospects

The Future Prospects assessment relates to the likely development and maintenance of Annex I sand dune habitats in favourable condition for the foreseeable future (Ellmauer, 2010). The "foreseeable future" is suggested by Ellmauer to be two reporting phases, i.e. 12 years. For dynamic coastal habitats, this also refers to the potential for the habitat to continue to develop according to coastal processes into the future.

After the field survey of each site had been completed and the entire site had been viewed, all of the ecologists who had been present at the site discussed the impacts and activities. Each impact was recorded using the standard EU code (Ssymank, 2010), and a brief description was given. A full list of impact codes is presented in Appendix V. The following details were recorded for each

impact: the intensity of the impact (high, medium or low), effect (positive, negative or neutral), the percentage of each habitat affected, and the source of the impact (from inside or outside the Annex I habitat). The data sheet for recording impacts is shown in Appendix VI.

The impacts and activities recorded during the survey allowed the ecologist to predict the future trend of the habitat, that is, whether the site would improve or deteriorate over the 12 years following the survey. This was used to predict the future Area and Structure and Functions status of the habitat. If the impacts and activities were expected to maintain or improve the Area and Structure and Functions of a habitat so that they would be in Favourable status in 12 years, the Future Prospects were Favourable. However, if the impacts and activities affecting a site were predicted to cause the habitat to be in Unfavourable-Inadequate condition in 12 years' time, then Future Prospects were assessed as Unfavourable-Inadequate. If the Area and Structure and Functions of a habitat are expected to be Unfavourable-Bad in 12 years' time on the basis of the impacts and activities recorded during the survey, Future Prospects were assessed as Unfavourable-Bad.

Structure and Functions data are required to assess the Future Prospects of a habitat. Although the impacts and activities affecting ***2140 Decalcified *Empetrum* dunes** and ***2150 Decalcified dune heath** were recorded, no Future Prospects assessment was carried out because their Structure and Functions were not assessed.

A scoring system (Table 2.6) was developed to evaluate the impacts and activities affecting habitats following the methodology described by O'Neill *et al*. (2010). This system allows each individual impact at a site to be given a numerical score. Source, as a factor, is not included in the calculation, as it is felt that this should have no bearing on the impact score. Low-intensity negative impacts affecting up to 1% of the habitat were not considered to be significant and were not scored. The Future Prospects score of an Annex I habitat within a site is the sum of its individual impact scores. The range of impact scores which a habitat receives across all assessed sites gives a good indication of the severity of impacts affecting it. Scores of zero or greater suggest the habitat has good Future Prospects, scores below zero indicate poor Future Prospects and scores considerably below zero indicate the Future Prospects of the habitat are bad. Although the impact score is a useful tool, the individual impacts affecting each site must be examined before the Future Prospects for a site are assessed because a positive impact score could potentially mask the presence of a negative impact.

Table 2.6: Scoring system used to quantify impacts in Annex I habitats (modified from O'Neill *et al*., 2010). Impact score is the mathematical product of all three attribute scores.

Attribute of impact	**Value**	**Attribute score**
1. Intensity of impact	High	1.5
	Medium	1
	Low	0.5
2. Effect of impact	Positive	1
	Neutral	0
	Negative	-1
3. % Area of Annex I polygon impacted	≥1%	0.5
	2-25%	1
	26-50%	1.5
	51-75%	2
	>75%	2.5
	100%	3

2.6 Conservation Assessment

Once Area, Structure and Functions and Future Prospects have been assessed, the overall conservation status of a habitat can be determined. Following the EU guidelines for the assessment of Annex I habitats (Evans and Arvela, 2011), the conservation status of a habitat is determined by the least positive score of the three parameters. The assessment of each parameter and of the conservation status of each habitat is qualified by the addition of a trend. The trend can be improving (i.e. becoming more positive) or deteriorating (i.e. becoming less positive), or can be described as stable, depending on whether the SDM assessment is more positive than, the same as, or more negative than the CMP assessment. Hence, the area of a habitat may be assessed as, for example, "Unfavourable-Inadequate (improving)" if habitat loss is still occurring but the rate of loss has slowed from over 1% per year during the CMP to less than 1% per year during the SDM.

3 Results

The results of the conservation assessments for each habitat are presented below. It should be noted that the assessments in this report specifically refer to the area within the sites surveyed, and therefore they do not correspond directly to the National Conservation Assessment for reporting under Article 17 of the Habitats Directive. Areas recorded during the SDM are compared with the revised CMP areas. Natural processes such as erosion, deposition and succession are primary drivers of change on coastal habitats, and only losses or gains in area due to anthropogenic factors are taken into account in the Area assessment. Comparisons to the data presented in Ryle *et al*. (2009) have limitations due to changes in the methodology, but the CMP findings have been considered where possible to determine trend.

3.1 1210 Annual vegetation of drift lines

3.1.1 Area and distribution

1210 Annual vegetation of drift lines was recorded at 21 sites distributed evenly around the coast with no clear regional focus during the SDM (Figure 3.1). This tended to be a fragmented, linear habitat, and it never occupied more than 4.55 ha at any site (Table 3.1). **Areas of 1210 Annual vegetation of drift lines** from site 246 Tramore (a subsite of site 46 Tramore) were included in the areas presented in Table 3.1.

The area of **1210 Annual vegetation of drift lines** mapped during the baseline survey, the revised baseline area and the area mapped in 2011/2012 are shown in Table 3.2 The small difference between the baseline area and the revised baseline area (0.04 ha) is due to more refined habitat mapping during the SDM.

Some areas of habitat mapped during the CMP could not be revisited in the 2011/2012 field seasons because of access difficulties. These unsurveyed areas were retained in the SDM maps and marked as "not surveyed". Because the actual change in area could not be established for these parts of the habitat, they were excluded from the change in area calculations. The total unsurveyed area of **1210 Annual vegetation of drift lines** was 0.51 ha. The remaining area which was included in the change in area calculations is shown in Table 3.2.

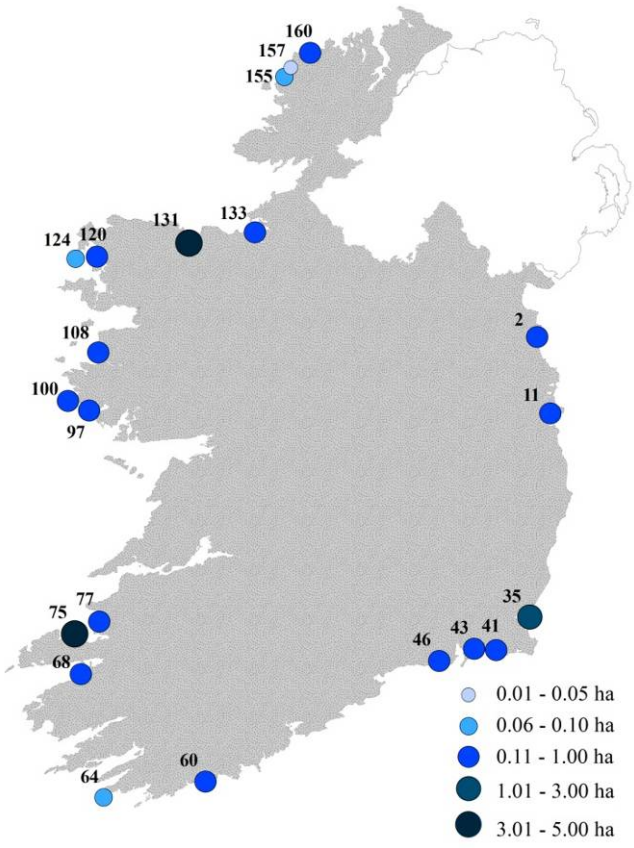

Figure 3.1: Distribution of SDM sites supporting 1210 Annual vegetation of drift lines with the area of the habitat indicated.

Table 3.1: Area of 1210 Annual vegetation of drift lines (surveyed and unsurveyed) on the revised CMP maps and the SDM maps.

Site no.	Site name	Revised CMP Area (ha)	SDM Area (ha)
2	Baltray	3.27	0.47
9	Portmarnock	0.59	0.00
10	North Bull Island	1.30	0.00
11	South Bull Island	0.08	0.11
28	Cahore Point North	0.19	0.00
35	The Raven	0.37	1.03
41	Ballyteige	0.09	0.66
43	Grange	0.10	0.18
46	Tramore	0.44	0.55
58	Inchydoney	0.25	0.00
60	Castlefreke	0.09	0.14
64	Barley Cove	0.29	0.06
68	Rossbehy	0.73	0.33
70	Inch	1.16	0.00
75	Castlegregory	9.51	3.67
77	Banna Strand	0.01	0.56
87	Fanore	0.02	0.00
97	Dogs Bay	0.22	0.22
100	Aillebrack	0.59	0.37
101	Doonloughan	0.16	0.00
108	Dooaghtry	0.07	0.18
120	Doo Lough	0.00	0.23
124	Aghleam	0.00	0.06
131	Bartragh	0.58	4.55
133	Strandhill	0.99	0.12
155	Kincaslough	0.03	0.09
157	Derrybeg	0.05	0.02
160	Dooey	0.00	0.52
175	Crummies Bay	0.10	0.00

Table 3.2: Area of 1210 Annual vegetation of drift lines within the sample sites as represented on different maps.

	Total mapped area (ha)	Area used in calculation of change (ha)
CMP area	21.32	n/a
Revised CMP area	21.28	20.77
SDM area	14.12	13.61

Table 3.3 shows the loss in area since the baseline survey due to natural and anthropogenic factors. The area of **1210 Annual vegetation of drift lines** within the sample sites has decreased by 7.16 ha (34.4%) since the baseline survey, but the vast majority of this loss cannot be ascribed to human activity. There has been an anthropogenic loss of 0.09 ha since the baseline survey. All of the anthropogenic loss can be attributed to the erection of sea defences at sites 155 Kincaslough and 133 Strandhill.

Table 3.3: Loss of area of 1210 Annual vegetation of drift lines since the baseline survey

	Area (ha)	**Area (%)**
Loss due to natural processes	7.07	34.0
Loss due to anthropogenic factors	0.09	0.4
Total loss	7.16	34.4

The recorded anthropogenic loss of 0.09 ha is equal to a loss of 0.4%. As this is a loss of less than 1% per year since the CMP, Area was assessed as Unfavourable-Inadequate.

3.1.2 Structure and Functions

Although **1210 Annual vegetation of drift lines** was recorded at 21 sites, the habitat was below the minimum monitoring area (0.04 ha) at site 157 Derrybeg and was very fragmented at site 124 Aghleam, and these sites were excluded from the Structure and Functions assessment. In total, 13.53 ha (95.8% of the total area mapped during the SDM) of **1210 Annual vegetation of drift lines** were included in the Structure and Functions assessment.

Table 3.4 shows the Structure and Functions assessment for each site where **1210 Annual vegetation of drift lines** was above the minimum monitoring area. Four sites (21.1%) were assessed as Unfavourable-Inadequate and 15 (78.9%) were assessed as Favourable. None of the sites were assessed as Unfavourable-Bad.

Expert judgement was used in one case. The habitat at site 60 Castlefreke was of poor quality and had only one positive indicator species. This was considered to relate to the exposed nature of the beach and was not considered to be the result of human activities, so the habitat was allowed to pass the Structure and Functions assessment.

Table 3.4: Results of the Structure and Functions assessment at each site where 1210 Annual vegetation of drift lines was assessed showing which of the criteria passed and failed. Favourable, Unfavourable-Inadequate and Unfavourable-Bad are abbreviated to F, U-I and U-B respectively.

Site no.	Positive indicator species	Rare species	Negative indicator species	Non-native species	Alterations to sediment dynamics	Damage due to disturbance	Assessment
2	Pass	Pass	Pass	Pass	Fail	Pass	U-I
11	Pass	Pass	Pass	Pass	Fail	Fail	U-I
35	Pass	Pass	Pass	Pass	Pass	Pass	F
41	Pass	Pass	Pass	Pass	Pass	Pass	F
43	Pass	Pass	Pass	Pass	Pass	Pass	F
46	Pass	Pass	Pass	Pass	Pass	Pass	F
60	Pass	Pass	Pass	Pass	Pass	Pass	F
64	Pass	Pass	Pass	Pass	Pass	Pass	F
68	Pass	Pass	Pass	Pass	Pass	Pass	F
75	Pass	Pass	Pass	Pass	Fail	Pass	U-I
77	Pass	Pass	Pass	Pass	Pass	Pass	F
97	Pass	Pass	Pass	Pass	Pass	Fail	U-I
100	Pass	Pass	Pass	Pass	Pass	Pass	F
108	Pass	Pass	Pass	Pass	Pass	Pass	F
120	Pass	Pass	Pass	Pass	Pass	Pass	F
131	Pass	Pass	Pass	Pass	Pass	Pass	F
133	Pass	Pass	Pass	Pass	Pass	Pass	F
155	Pass	Pass	Pass	Pass	Pass	Pass	F
160	Pass	Pass	Pass	Pass	Pass	Pass	F

The criterion which failed most frequently (15.7% of sites) assessed whether there were alterations to the sediment dynamics of the habitat (Table 3.5). These alterations were frequently related to sea defences, but beach cleaning was included in this category as it resulted in the removal of sediment. The criterion assessing the effects of disturbance failed at 10.5% of sites, and this was caused by recreational activities.

Table 3.5: The percentage of sites at which each criterion failed in the Structure and Functions assessment of 1210 Annual vegetation of drift lines

Criterion	**Failed (% of sites)**
Positive indicator species	0.0
Rare species	0.0
Negative indicator species	0.0
Non-native species	0.0
Alterations to sediment dynamics	15.7
Damage due to disturbance	10.5

Structure and Functions were assessed at a national level as Favourable during the baseline survey. The area of **1210 Annual vegetation of drift lines** which was assessed as Favourable or Unfavourable in 2011/2012 is presented in Table 3.6. The Structure and Functions of most of the habitat (94.8% of the area) were assessed as Favourable, but as 5.2% of the habitat was Unfavourable, the Structure and Functions of **1210 annual vegetation of drift lines** was assessed as Unfavourable-Inadequate.

Table 3.6: The total assessed area and percentage of area of 1210 Annual vegetation of drift lines in Favourable and Unfavourable condition in 2011/2012.

	Area (ha)	**Area (%)**
Favourable	12.83	94.8
Unfavourable	0.70	5.2

3.1.3 Future prospects

For the 21 sites where **1210 Annual vegetation of drift lines** was recorded, negative impacts occurred at eight sites, neutral impacts occurred at six sites and seven sites were recorded as having no impacts or activities at all. No positive impacts or activities were recorded for this habitat. The median impact score for the habitat was 0 and the most negative impact score was -6. Three neutral impacts were recorded (Table 3.7), and these consisted of low-intensity recreational activities (e.g. walking), erosion and coastal protection structures which pre-dated designation and did not have a negative effect on the habitat at time of survey.

Table 3.7: Neutral impacts affecting 1210 Annual vegetation of drift lines, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
G01.02	Walking, horse riding and non-motorised vehicles	14.3	0.0	0.0	14.3	0.58	4.1
K01.01	Erosion	0.0	0.0	14.3	14.3	0.48	3.4
J02.12.01	Sea defence or coast protection works, tidal barrages	4.8	0.0	0.0	4.8	0.03	0.2

Negative impacts affecting **1210 Annual vegetation of drift lines** are presented in Table 3.8. The negative impact which affected the greatest area was Sea defence or coastal protection works (affecting 0.47 ha). These were recorded where rock gabions, sea walls and piers were constructed or extended and these affected the patterns of sediment cycling. The impact affecting the second greatest area was Reduction or loss of specific habitat features. This was caused by an exclosure at site 2 Baltray which was erected as part of a Little Tern (*Sterna albifrons*) conservation programme. The exclosure has reduced the mobility of the sediment and artificially stabilised the habitat in an area of 0.33 ha. Sand extraction was noted at site 75 Castlegregory. At site 11 South Bull Island, the sediment supply has been affected by beach cleaning which involves removal of the upper layer of sand and algae, which is then deposited in mounds in the fore-dunes. Trampling was recorded at site 11 South Bull Island and site 97 Dog's Bay, both of which receive heavy amenity use.

Table 3.8: The five negative impacts affecting the greatest area of 1210 Annual vegetation of drift lines, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
J02.12.01	Sea defence or coast protection works, tidal barrages	4.8	9.5	14.3	28.6	0.47	3.3
J03.01	Reduction or loss of specific habitat features	0.0	4.8	0.0	4.8	0.24	1.7
C01.01.02	Removal of beach materials	0.0	0.0	4.8	4.8	0.18	1.3
G05.05	Intensive maintenance of public parks /cleaning of beaches	0.0	0.0	4.8	4.8	0.11	0.8
G05.01	Trampling, overuse	0.0	9.5	0.0	9.5	0.06	0.4

The impacts and activities which were recorded in **1210 Annual vegetation of drift lines** have affected the condition of some sites, which led the Structure and Functions to be assessed as Unfavourable-Inadequate. No positive impacts were recorded that will improve the condition of the habitat over the next 12 years (two reporting periods); however, the impacts are not predicted to cause an increased rate of degradation of the habitat. Future prospects were assessed as Unfavourable-Inadequate during the CMP. On the basis of the impacts recorded during the SDM, the condition of the habitat is likely to remain stable over the next 12 years and the Future Prospects are assessed as Unfavourable-Inadequate.

3.1.4 Conservation assessment

Because Area, Structure and Functions and Future Prospects were all assessed as Unfavourable-Inadequate, **1210 Annual vegetation of drift lines** was assessed as Unfavourable-Inadequate during the SDM (Table 3.9). All of the parameters have maintained the same assessment status as they received in the CMP with the exception of Structure and Functions, which has declined from Favourable to Unfavourable-Inadequate.

Anthropogenic loss of 0.4% has taken place since the CMP, which is equal to loss of less than 1% per year. As a result, Area was assessed as Unfavourable-Inadequate during the SDM. This

assessment is comparable to the assessment given in the CMP when Area was assessed as Unfavourable-Inadequate and loss of 0.6% was considered to have occurred in the years 1996 to 2006. Because losses due to human activity have continued to occur since the CMP, the trend was assessed as declining.

Structure and Functions have deteriorated since the CMP, when they were assessed as Favourable. The two criteria which failed most frequently during the SDM (alterations to the sediment dynamics and damage due to disturbance) were not assessed during the CMP, and this could partially explain the more negative result during the SDM. However, the information relating to impacts and activities, where sea defences and damaging activities were recorded, suggests that the factors which cause alteration to sediment dynamics and damage were less widespread during the CMP and deterioration in the habitat is genuine.

Future Prospects were assessed as Unfavourable-Inadequate during the SDM and during the CMP. Overall, the impacts and activities noted during both projects were similar, although sea defences appeared to be more widespread in 2011/2012. During the CMP, the most frequently recorded impacts were walking and horse-riding, erosion, trampling and sea defences. Sand extraction and beach cleaning were thought to have been under-recorded during the CMP (Ryle *et al.*, 2009). The majority of impacts and activities recorded during the SDM are likely to continue to affect the habitat, but a change in the conservation status of the habitat to Unfavourable-Bad is not predicted over the next 12 years. As the majority of the threats recorded in the CMP were also recorded in the SDM Future Prospects were assessed as Unfavourable-Inadequate (stable).

All of the parameters were assessed as Unfavourable-Inadequate and the trend for two of the three parameters was deteriorating, so **1210 Annual vegetation of drift lines** was assessed as Unfavourable-Inadequate (deteriorating).

Table 3.9: Results of the conservation assessment of 1210 Annual vegetation of drift lines.

Parameter	**CMP Assessment**	**SDM Assessment**	**Trend**
Area	Unfavourable-Inadequate	Unfavourable-Inadequate	Deteriorating
Structure and Functions	Favourable	Unfavourable-Inadequate	Deteriorating
Future Prospects	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable
Conservation assessment	Unfavourable-Inadequate	Unfavourable-Inadequate	Deteriorating

3.2 1220 Perennial vegetation of stony banks

3.2.1 Area and distribution

1220 Perennial vegetation of stony banks was recorded at 14 of the 39 sites included in the SDM (Figure 3.2). There has been a slight decrease in the number of sites where the habitat was found since the CMP, when it occurred at 16 sites. It is widely distributed around the coast and occurs as small fragmented areas, the largest of which was 0.79 ha at site 133 Strandhill (Table 3.10). More extensive shingle banks independent of large sand dune systems were not within the remit of this project.

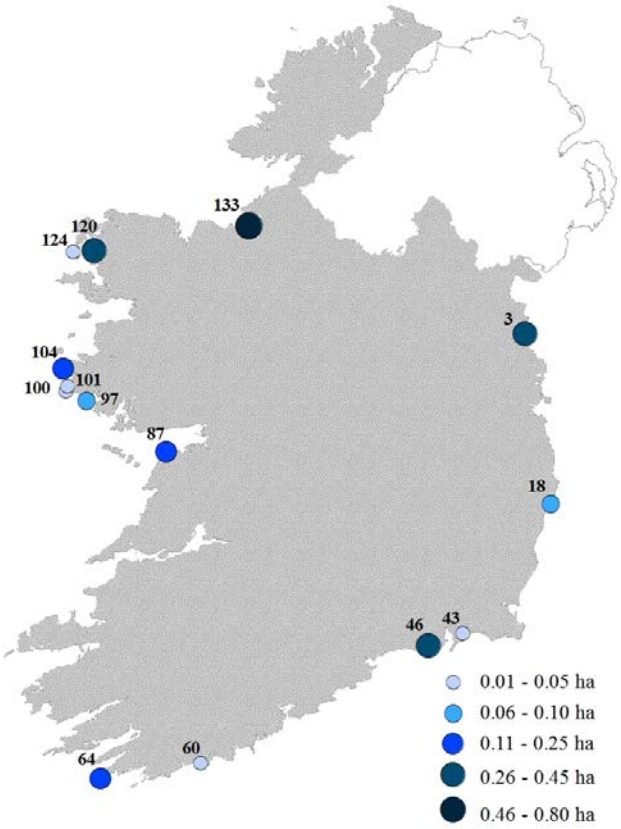

Figure 3.2: Distribution of SDM sites supporting 1220 Perennial vegetation of stony banks with the area of the habitat indicated.

Table 3.10: Area of 1220 Perennial vegetation of stony banks (surveyed and unsurveyed) on the revised CMP maps and the SDM maps.

Site no.	Site name	Revised CMP Area (ha)	SDM Area (ha)
2	Baltray	0.29	0.00
3	Mornington	0.59	0.26
18	Mizen Head	0.00	0.08
35	The Raven	0.20	0.00
41	Ballyteige	0.51	0.00
43	Grange	0.05	0.02
46	Tramore	0.21	0.36
60	Castlefreke	0.02	0.02
64	Barley Cove	1.07	0.12
68	Rosbehy	0.05	0.00
75	Castlegregory	0.06	0.00
87	Fanore	0.09	0.22
97	Dogs Bay	0.16	0.06
100	Aillebrack	0.00	0.04
101	Doonloughan	0.03	0.02
104	Omey Island	0.15	0.16
120	Doo Lough	0.00	0.42
124	Aghleam	0.00	0.03
133	Strandhill	1.53	0.79
160	Dooey	0.37	0.00

The area of **1220 Perennial vegetation of stony banks** mapped during the CMP, the revised CMP area and the area mapped during the SDM are shown in Table 3.11.

Table 3.11: Area of 1220 Perennial vegetation of stony banks within the sample sites as represented on different maps.

	Area (ha)
CMP area	5.96
Revised CMP area	5.39
SDM area	2.60

The difference between the CMP and the Revised CMP areas was due to more detailed mapping and also due to a change in the interpretation of **1220 Perennial vegetation of stony banks.** Some vegetation communities consisting of short-lived species on shingle which were included in this habitat during the CMP were reclassified as **1210 Annual vegetation of drift lines** during the SDM. Where possible, the revised baseline areas were amended to take account of this change.

Area was assessed as Unfavourable-Inadequate during the CMP. The total area of **1220 Perennial vegetation of stony banks** decreased from 5.39 ha to 2.60 ha. There was no evidence in the field to suggest that the loss was due to human activities. No anthropogenic loss was recorded during the SDM, but there were no indications that habitat restoration or improved management had taken place to address the losses recorded during the CMP, and Area was assessed as Unfavourable-Inadequate.

3.2.2 Structure and Functions

Structure and Functions assessments were carried out at nine of the 14 sites where **1220 Perennial vegetation of stony banks** was recorded (Table 3.12). The area of the habitat was below the minimum monitoring area at sites 43 Grange, 60 Castlefreke, 101 Doonloughan and 124 Aghleam. The area of the habitat present at site 100 Aillebrack was underestimated in the field due to its fragmented nature and no monitoring stops were carried out there. In total, 2.48 ha (95.4% of the mapped area) were included in the Structure and Functions assessment. The habitat was assessed as Unfavourable-Inadequate at three of the nine sites (33.3%) where it was assessed.

Table 3.12: Results of the Structure and Functions assessment at each site where 1220 Perennial vegetation of stony banks was assessed showing which of the criteria passed and failed. Favourable, Unfavourable-Inadequate and Unfavourable-Bad are abbreviated to F, U-I and U-B respectively.

Site no.	Positive indicator species	Rare species	Negative indicator species	Non-native species	Alterations to sediment dynamics	Damage due to disturbance	Assessment
3	Pass	Pass	Pass	Pass	Pass	Fail	U-I
18	Fail	Pass	Pass	Pass	Pass	Pass	U-I
46	Pass	Pass	Pass	Pass	Pass	Pass	F
64	Pass	Pass	Pass	Pass	Pass	Pass	F
87	Pass	Pass	Pass	Pass	Pass	Pass	F
97	Pass	Pass	Pass	Pass	Pass	Pass	F
104	Pass	Pass	Pass	Pass	Pass	Pass	F
120	Pass	Pass	Pass	Pass	Fail	Pass	U-I
133	Pass	Pass	Pass	Pass	Pass	Pass	F

Table 3.13 shows the percentage of sites at which each criterion failed in the Structure and Functions assessment. The criterion assessing the number of typical indicator species failed at site 18 Mizen Head. The community here was poorly developed, and this may be the result of historic alterations to the site such as changes to the stream flow and the conversion of adjacent land for use as a golf course. The habitat was allowed to pass this criterion on expert judgement at site 64 Barley Cove as there was no indication that the lack of positive indicator species was the result of human activities. Alterations to sediment dynamics failed at site 120 Doo Lough, where a sea wall and car park have been constructed close to a portion of the habitat in the last six years. The habitat at site 3 Mornington, had suffered damage due to disturbance at two of the four monitoring stops.

Table 3.13: The percentage of sites at which each criterion failed in the Structure and Functions assessment of 1220 Perennial vegetation of stony banks.

Criterion	Failed (% of sites)
Positive indicator species	11.1
Rare species	0.0
Negative indicator species	0.0
Non-native species	0.0
Alterations to sediment dynamics	11.1
Damage due to disturbance	11.1

The total area of **1220 Perennial vegetation of stony banks** within the sample sites which was assessed as Favourable and Unfavourable is presented in Table 3.14. The Structure and Functions of 93.1% of the total area were assessed as Favourable, with 6.9% of the area assessed as Unfavourable.

Table 3.14: The total assessed area and percentage of area of 1220 Perennial vegetation of stony banks in Favourable and Unfavourable condition in 2011/2012.

	Area (ha)	Area (%)
Favourable	2.31	93.1
Unfavourable	0.17	6.9

Structure and Functions were assessed as Unfavourable-Inadequate during the baseline survey. As 6.9% of the habitat is in Unfavourable condition, the Structure and Functions were assessed as Unfavourable-Inadequate during the SDM.

3.2.3 Future prospects

Neutral impacts were recorded for **1220 Perennial vegetation of stony banks** at seven sites, negative impacts were recorded at three sites, and at seven sites no impacts were observed for this habitat. No positive impacts or activities were recorded. The median impact score was 0 and the lowest score for this habitat at any site was -2.75.

The five neutral impacts affecting the greatest area are shown in Table 3.15. The two impacts that affected the largest area were walking and old sea defences with which the habitat has come into equilibrium. Flooding, erosion and paths were each noted at one site.

Table 3.15: The five neutral impacts affecting 1220 Perennial vegetation of stony banks, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
G01.02	Walking, horse riding and non-motorised vehicles	14.3	7.1	0.0	21.4	0.53	20.3
J02.12.01	Sea defence or coast protection works, tidal barrages	0.0	7.1	7.1	14.3	0.35	13.3
J02.04.01	Flooding	0.0	7.1	0.0	7.1	0.08	3.2
K01.01	Erosion	0.0	0.0	7.1	7.1	0.02	0.8
D01.01	Paths, tracks, cycling tracks	0.0	0.0	7.1	7.1	<0.01	<0.1

Only four negative impacts were recorded (Table 3.16), and these included walking, waste related to human activities (gardening and dog walking), trampling and newly erected sea defences. The impact of dog waste affected 20% of the habitat at site 46 Tramore, where it has artificially increased the nutrient content of the shingle. However, negative species associated with nutrient enriched substrates have not yet become problematic. A newly built sea wall at site 120 Doo Lough has an indirect effect on the habitat by altering the wave action, but the outcome of the coastal protection works is yet to be understood and therefore this impact was recorded as neutral in this particular case.

Table 3.16. Negative impacts affecting 1220 Perennial vegetation of stony banks, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
G01.02	Walking, horse riding and non-motorised vehicles	7.1	0.0	0.0	7.1	0.13	5.0
H05.01	Garbage and solid waste	7.1	7.1	0.0	14.3	0.09	3.3
G05.01	Trampling, overuse	0.0	7.1	0.0	7.1	0.03	1.0
J02.12.01	Sea defence or coast protection works, tidal barrages	7.1	0.0	0.0	7.1	<0.01	<0.1

Future Prospects were assessed as Unfavourable-Inadequate during the CMP. The impacts and activities currently affecting **1220 Perennial vegetation of stony banks** are expected to maintain the habitat in Unfavourable-Inadequate condition, and Future Prospects were assessed as Unfavourable-Inadequate.

3.2.4 Conservation assessment

The conservation status of each of the parameters assessed during the SDM is presented in Table 3.17. It should be borne in mind that the examples of **1220 Perennial vegetation of stony banks** included in this assessment are marginal, beach fringing communities and may not be fully representative of larger, more stable shingle banks.

During the CMP, 1.4% loss was estimated to have occurred over the previous ten years. It was not clear how much of this loss could be ascribed to human activity, but Area was assessed as Unfavourable-Inadequate. The total area of **1220 Perennial vegetation of stony banks** has decreased by 51.8% from 5.39 ha to 2.60 ha since the CMP. There was no evidence in the field to suggest that the loss was due to human activities, and only the most dynamic form of this habitat was included in the SDM, so dramatic natural fluctuations in the area covered by the habitat are to be expected. Although no evidence of continuing losses was observed, there was no evidence that the losses indicated by the CMP in assessing the habitat as Unfavourable-Inadequate had been remediated, and Area was assessed as Unfavourable-Inadequate (stable).

Structure and Functions were assessed as Unfavourable-Inadequate during the baseline survey. Only two criteria were assessed: positive indicator species and negative indicator species. Only

one monitoring stop at one site failed the Structure and Functions assessment during the CMP, but several other sites were assessed as Unfavourable on expert judgement. According to the CMP report (Ryle *et al.* 2009), the "presence of man-made structures" was indicated for several sites, but it was not an assessment criterion for Structure and Functions. Sea defences, walking, motorised vehicles and trampling were noted as negative impacts and these indicate that the criteria which failed during the SDM may well have failed during the CMP if the same methodology had been applied. Although the criteria assessing positive indicator species was assessed during the CMP, it is not clear what the target value was for this criterion and the more negative assessment is most likely to be the result of a stricter approach rather than a genuine deterioration in the habitat. Structure and Functions were assessed as Unfavourable-Inadequate (stable).

Future Prospects were assessed as Unfavourable-Inadequate during the CMP. All of the negative impacts noted during the SDM were also noted during the CMP, assuming that H05.01 Garbage and solid waste corresponds to the previous code 423 Disposal of inert materials. Two impacts were noted during the CMP but were not noted during the SDM, and these related to driving in the habitat and removal of beach materials. The fact that these were not noted during the SDM cannot be taken as a sign of improvement as the reduced number of negative impacts may be due to the smaller sample size. No change in the conservation status of the habitat is predicted over the next 12 years, and Future Prospects were assessed as Unfavourable-Inadequate (stable).

On the basis of the sites surveyed during the SDM, the conservation status of **1220 Perennial vegetation of stony banks** was assessed as Unfavourable-Inadequate (stable).

Table 3.17: Results of the conservation assessment of 1220 Perennial vegetation of stony banks.

Parameter	**CMP Assessment**	**SDM Assessment**	**Trend**
Area	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable
Structure and Functions	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable
Future Prospects	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable
Conservation assessment	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable

3.3 2110 Embryonic shifting dunes

3.3.1 Area and distribution

2110 Embryonic shifting dunes habitat was recorded at 36 of the 39 sites included in the SDM. The distribution of **2110 Embryonic shifting dunes** is shown in Figure 3.3 and the area mapped during the CMP and the SDM at sites visited in 2011/2012 are shown in Table 3.18.

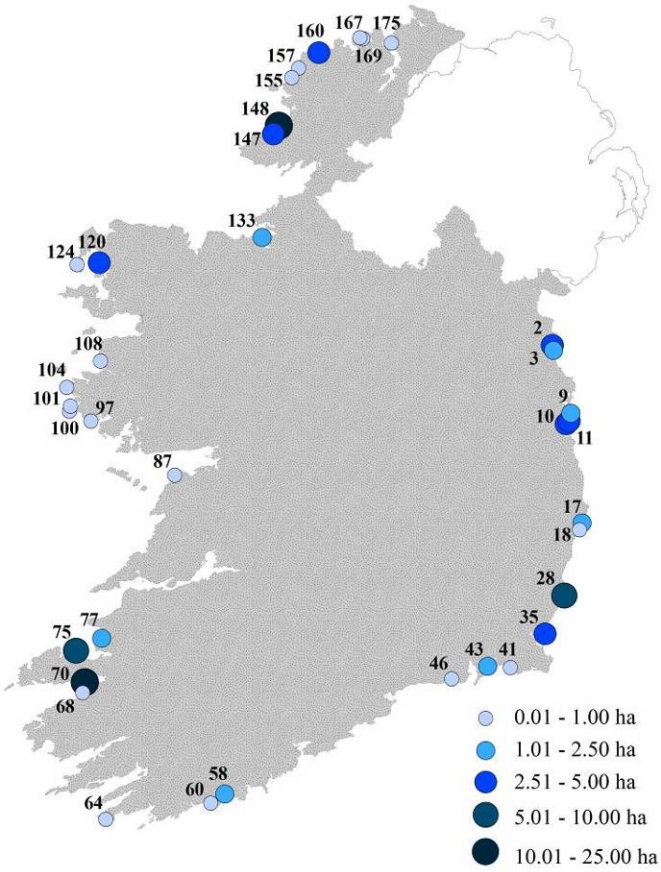

Figure 3.3: Distribution of SDM sites supporting 2110 Embryonic shifting dunes with the area of the habitat indicated.

Table 3.18: Area of 2110 Embryonic shifting dunes (surveyed and unsurveyed) on the revised CMP maps and the SDM maps.

Site no.	Site name	Revised CMP Area (ha)	SDM Area (ha)
2	Baltray	2.61	3.37
3	Mornington	0.66	1.73
9	Portmarnock	1.58	2.08
10	North Bull Island	2.45	2.64
11	South Bull Island	0.44	3.43
17	Brittas Bay	0.65	2.14
18	Mizen Head	0.91	0.22
28	Cahore Point North	4.71	5.15
35	The Raven	1.12	3.73
41	Ballyteige	0.09	0.43
43	Grange	1.44	1.29
46	Tramore	4.30	0.72
58	Inchydoney	0.05	1.62
60	Castlefreke	0.05	0.04
64	Barley Cove	0.05	0.16
68	Rossbehy	0.79	0.21
70	Inch	14.74	21.74
75	Castlegregory	1.28	7.19
77	Banna Strand	2.10	2.38
87	Fanore	0.28	0.12
97	Dogs Bay	0.53	0.18
100	Aillebrack	0.56	0.71
101	Doonloughan	0.62	0.61
104	Omey Island	0.62	0.81
108	Dooaghtry	0.54	0.53
120	Doo Lough	0.00	2.53
124	Aghleam	1.48	0.92
131	Bartragh Island	0.75	0.00
133	Strandhill	0.94	1.33
147	Maghera	0.43	4.75
148	Sheskinmore	9.04	10.73
155	Kincaslough	0.06	0.14
157	Derrybeg	1.45	0.69
160	Dooey	4.79	4.81
167	Tranarossan	0.04	0.40
169	Lough Nagreany	0.77	0.61
175	Crummies Bay	0.09	0.15

This habitat is widely distributed and can occur as small, fragmented patches or as more extensive areas, depending on the natural processes of erosion and accretion occurring at a site. The greatest area at any site was site 70 Inch, where 21.74 ha were recorded. Areas at two subsites, site 212 Derryness (a subsite of site 148 Sheskinmore) and site 246 Tramore (a subsite of site 46 Tramore) were included in the areas presented in Table 3.18.

The areas of **2110 Embryonic shifting dunes** mapped during the baseline survey, the revised baseline area and the area mapped in 2011/2012 are shown in Table 3.19. The Revised CMP was increased slightly to include an area that was vegetated at the time of the baseline survey but was not included on the CMP habitat maps. A small part (0.08 ha) of the habitat that had been mapped during the baseline survey could not be accessed during the SDM project. Although the area was included in the revised baseline maps and SDM maps, it was marked as unsurveyed and excluded from the change in area analysis. Similarly, part (0.56 ha) of the habitat that had been mapped during the baseline survey could not be accessed during the SDM project at a sub-site (212) of site 148 Sheskinmore. It was retained and marked as "not surveyed" in the SDM habitat maps. To prevent overestimation of the change in area, this additional 0.56 ha was also excluded from the change in area analysis. The area included in the calculation of change is shown in Table 3.19.

Table 3.19: Area of 2110 Embryonic shifting dunes within the sample sites as represented on different maps.

	Total mapped area (ha)	**Area included in calculation of change (ha)**
CMP area	62.24	n/a
Revised CMP area	63.00	62.36
SDM area	90.27	89.63

The change in area since the baseline survey is shown in Table 3.20. Although the total area increased, at site 11 South Bull Island, beach cleaning and dumping of beach materials has resulted in the loss of 0.81 ha of **2110 Embryonic shifting dunes**. This represents a loss of less than 1% per year since the baseline survey.

Table 3.20: Change of area of 2110 Embryonic shifting dunes since the baseline survey

	Area (ha)	**Area (%)**
Increase in area	28.08	45.0
Loss due to anthropogenic factors	0.81	1.3
Net change of area (increase)	27.27	43.7

Area was assessed as Unfavourable-Inadequate during the CMP. As the anthropogenic decline in Area is less than 1% per year since the baseline survey, Area was assessed as Unfavourable-Inadequate during the SDM.

3.3.2 Structure and Functions

Of the 36 sites where **2110 Embryonic shifting dunes** were assessed, 25 sites were assessed as Favourable, 10 as Unfavourable-Inadequate and one site was assessed as Unfavourable-Bad (Table 3.21).

Table 3.21: Results of the Structure and Functions assessment at each site where 2110 Embryonic shifting dunes habitat was assessed showing which of the criteria passed and failed. Favourable, Unfavourable-Inadequate and Unfavourable-Bad are abbreviated to F, U-I and U-B respectively.

Site no.	Positive indicator species	Rare species	Negative indicator species	Non-native species	Health of the vegetation	Alterations to sediment dynamics	Damage due to disturbance	Assessment
2	Pass	Pass	Pass	Pass	Pass	Fail	Fail	U-I
3	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
9	Pass	Pass	Pass	Pass	Pass	Fail	Fail	U-I
10	Pass	Pass	Pass	Pass	Pass	Fail	Pass	U-I
11	Pass	Pass	Pass	Fail	Pass	Fail	Fail	U-B
17	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
18	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
28	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
35	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
41	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
43	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
46	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
58	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
60	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
64	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
68	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
70	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
75	Pass	Pass	Pass	Pass	Pass	Fail	Pass	U-I
77	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
87	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
97	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
100	Pass	Pass	Pass	Pass	Pass	Fail	Fail	U-I
101	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
104	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
108	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
120	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
124	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
133	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
147	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
148	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
155	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
157	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F

Site no.	Positive indicator species	Rare species	Negative indicator species	Non-native species	Health of the vegetation	Alterations to sediment dynamics	Damage due to disturbance	Assessment
160	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
167	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
169	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
175	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F

Table 3.22 shows the percentage of sites at which each criterion failed in the Structure and Functions assessment. The criterion that failed most frequently assessed damage due to disturbance, and the second most frequent criterion to fail assessed alterations to the sediment dynamics including construction of sea defences and sand extraction. Non-native species were only problematic at one site.

Table 3.22: The percentage of sites at which each criterion failed in the Structure and Functions assessment.

Criterion	Failed (% of sites)
Positive indicator species	0.0
Rare species	0.0
Negative indicator species	0.0
Non-native species	2.8
Health of the vegetation	0.0
Alterations to sediment dynamics	13.9
Damage due to disturbance	25.0

The most frequent reason for a site to be assessed as Unfavourable was damage due to disturbance followed by alterations to sediment dynamics which includes coastal protection works. Non-native species were problematic at one site. The area in Favourable condition was calculated within the 89.63 ha which could be surveyed during the SDM. Although a third of sites were assessed as Unfavourable, the total area of the habitat in Unfavourable condition was 13.3% during the SDM (Table 3.23), which is consistent with an assessment of Unfavourable-Inadequate. Structure and Functions were assessed as Unfavourable-Inadequate during the baseline survey.

Table 3.23: The total assessed area and percentage of area of 2110 Embryonic shifting dunes in Favourable or Unfavourable condition in 2011/2012.

	Area (ha)	Area (%)
Favourable	77.73	86.7
Unfavourable	11.90	13.3

3.3.3 Future Prospects

Neutral impacts were recorded at 23 sites, negative impacts were recorded at 15 sites, and no impacts were recorded at nine sites. No positive impacts were recorded for the habitat. The median impact score for **2110 Embryonic shifting dunes** at sites was 0 and the lowest score of any site was -6.5.

The neutral impact affecting the greatest area was walking, followed by natural erosion and long-established sea defences (Table 3.24).

Table 3.24: The five neutral impacts affecting the greatest area of 2110 Embryonic shifting dunes, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
G01.02	Walking, horse riding and non-motorised vehicles	43.2	5.4	0.0	48.6	12.35	13.7
K01.01	Erosion	2.7	10.8	10.8	24.3	8.66	9.6
J02.12.01	Sea defence or coastal protection works, tidal barrages	2.7	5.4	5.4	13.5	4.13	4.6
A04.02.01	Non intensive cattle grazing	5.4	0.0	0.0	5.4	0.52	0.6
D01.01	Paths, tracks, cycling tracks	2.7	2.7	0.0	5.4	0.11	0.1

At some sites, the pressure of large numbers of people walking in the habitat had a negative effect (Table 3.25). Horse riding was also problematic, particularly where sand dune habitats were used to gallop horses. Although removal of beach materials (through beach cleaning) was only recorded at site 10 North Bull Island and site 11 South Bull Island, it affected a large area. Trampling was focused close to car parks and access points. Sea defence or coastal protection works were recorded as a negative activity at three sites and non-native species were problematic at one site.

Table 3.25: The five negative impacts affecting the greatest area of 2110 Embryonic shifting dunes, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
G01.02	Walking, horse riding and non-motorised vehicles	13.5	2.7	0.0	16.2	6.19	6.9
G05.05	Intensive maintenance of public parks /cleaning of beaches	0.0	5.4	0.0	5.4	6.07	6.7
G05.01	Trampling, overuse	0.0	10.8	13.5	24.3	4.92	5.5
J02.12.01	Sea defence or coast protection works, tidal barrages	2.7	5.4	0.0	8.1	1.83	2.0
I01	Invasive non-native species	2.7	0.0	0.0	2.7	0.69	0.8

If the impacts affecting **2110 Embryonic shifting dunes** remain unchanged over the next 12 years, the habitat will remain in Unfavourable condition, but is not expected to deteriorate. Future Prospects were assessed as Unfavourable-Inadequate during the baseline survey. The current assessment is Unfavourable-Inadequate.

3.3.4 Conservation assessment

Table 3.26 shows the conservation assessment of **2110 Embryonic shifting dunes** during the SDM. During the CMP, Area was assessed as Unfavourable-Inadequate as it was believed to have decreased by 4.8 ha over the previous ten years. It is not clear how much of this loss was related to human activities. Area has declined by 0.81 ha (1.3%) since the CMP survey, which is consistent with an assessment of Unfavourable-Inadequate, and the fact that losses continue to occur means that the trend is deteriorating.

Structure and Functions were assessed as Unfavourable-Inadequate during the CMP. Only three criteria were assessed: positive indicator species, negative species and flowering and fruiting. Flowering and fruiting was the criterion that failed most frequently at that time, followed by negative indicator species. Flowering and fruiting passed at all sites during the SDM, although at

one site, it was allowed to pass on expert judgement because the site was surveyed outside of the flowering season. The criteria that failed most frequently during the SDM were not assessed during the CMP, but trampling and sea defences were listed as impacts, indicating that damage due to disturbance and interference with the sediment availability were affecting the habitat during the CMP. No significant change in the Structure and Functions of the habitat was identified, and Structure and Functions were assessed as Unfavourable-Inadequate (stable) during the SDM.

Three of the four most frequently recorded impacts during the CMP appeared in the list of the top five negative impacts during the SDM, and the fourth, erosion, was listed as one of the most widespread neutral impacts. Two negative impacts appeared in the list of the top five negative impacts for the first time during the SDM. Beach cleaning was recorded from two sites and invasive non-native species were recorded from one site. Although beach cleaning was not recorded during the CMP, it was mentioned in the individual site report for one of the sites affected (South Bull Island) and a management plan for Bull Island dating to 2011 states that mechanical scraping of the shoreline and deposition of the resulting sediments in the fore-dunes was a management policy at the site. Because of these records, beach cleaning is not considered a new impact. The presence of the non-native species *Senecio squalidus* at site 11 South Bull Island is of concern and should be addressed, but this is unlikely to result in the habitat deteriorating to Unfavourable-Bad within the next 12 years. There was no significant change in the assessment of **2110 Embryonic shifting dunes** and Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

All of the parameters were assessed as Unfavourable-Inadequate during the SDM, as they were during the CMP. Area, however, was considered to be deteriorating due to continuing losses. The conservation status of **2110 Embryonic shifting dunes** was assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Table 3.26: Results of the conservation assessment of 2110 Embryonic shifting dunes.

Parameter	CMP Assessment	SDM Assessment	Trend
Area	Unfavourable-Inadequate	Unfavourable-Inadequate	Deteriorating
Structure and Functions	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable
Future Prospects	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable
Conservation assessment	Unfavourable-Inadequate	Unfavourable-Inadequate	Deteriorating

3.4 2120 Marram dunes (white dunes)

3.4.1 Area and distribution

2120 Marram dunes (white dunes) were found at 36 of the 39 sites included in the SDM (Figure 3.4). The greatest area was recorded at site 70 Inch, where the habitat covered 18.87 ha (Table 3.27).

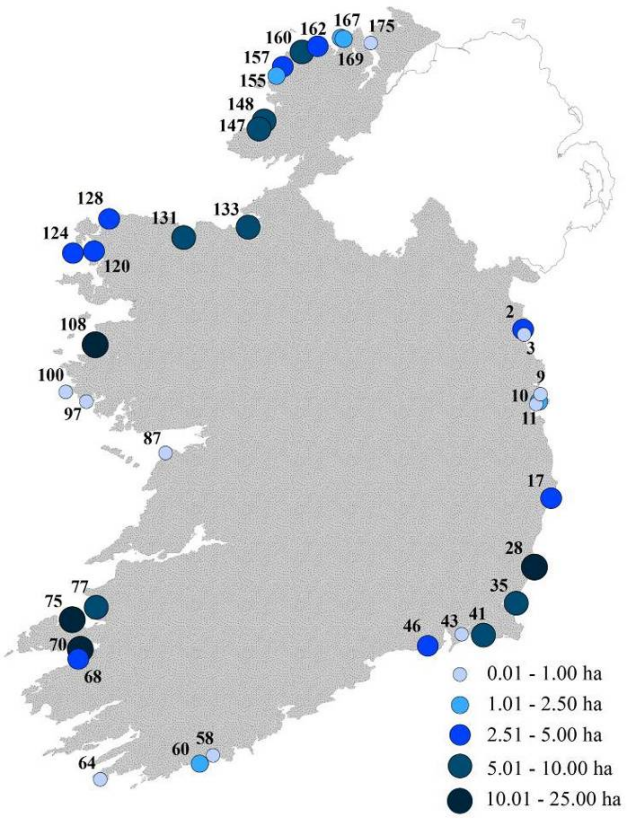

Figure 3.4: Distribution of SDM sites supporting 2120 Marram dunes (white dunes) with the area of the habitat.

Table 3.27: Area of 2120 Marram dunes (white dunes) (surveyed and unsurveyed) on the revised CMP maps and SDM maps.

Site no.	Site name	Revised CMP area (ha)	SDM Area (ha)
2	Baltray	4.36	2.73
3	Mornington	2.98	0.86
9	Portmarnock	3.79	0.14
10	North Bull Island	6.94	2.20
11	South Bull Island	5.13	0.97
17	Brittas Bay	3.31	3.66
18	Mizen Head	1.10	0.00
28	Cahore Point North	24.18	14.51
35	The Raven	10.93	5.40
41	Ballyteige	6.24	8.11
43	Grange	0.65	0.06
46	Tramore	3.31	2.7
58	Inchydoney	0.42	0.78
60	Castlefreke	1.78	1.65
64	Barley Cove	0.77	0.71
68	Rossbehy	10.39	3.07
70	Inch	25.81	18.87
75	Castlegregory	6.14	12.46
77	Banna Strand	6.78	5.32
87	Fanore	0.38	0.43
97	Dogs Bay	0.46	0.36
100	Aillebrack	0.18	0.27
108	Dooaghtry	18.45	12.43
120	Doo Lough	4.60	3.56
124	Aghleam	5.13	3.85
128	Garter Hill	13.38	2.51
131	Bartragh	7.52	9.28
133	Strandhill	5.47	5.47
147	Maghera	6.51	7.11
148	Sheskinmore	15.62	9.16
155	Kincaslough	0.81	1.59
157	Derrybeg	5.03	3.96
160	Dooey	10.55	8.98
162	Rinclevan	5.74	4.08
167	Tranarossan	2.52	1.65
169	Lough Nagreany	1.22	1.05
175	Crummies Bay	0.46	0.38

Areas at two subsites, site 212 Derryness (a subsite of site 148 Sheskinmore) and site 246 Tramore (a subsite of site 46 Tramore) were included in the areas presented in Table 3.27.

The area of **2120 Marram dunes (white dunes)** mapped during the baseline survey, the revised baseline area and the area mapped in 2011/2012 are shown in Table 3.28. Part (1.75 ha) of the habitat which had been mapped during the baseline survey could not be accessed during the SDM project. It was retained and marked as "not surveyed" in the SDM habitat maps. To prevent overestimation of the change in area, 1.75 ha was excluded from the change in area analysis. The areas which were included in the area calculation are shown on Table 3.28.

Table 3.28: Area of 2120 Marram dunes (white dunes) within the sample sites as represented on different maps.

	Total mapped area (ha)	**Area included in calculation of change (ha)**
CMP	231.44	n/a
Revised CMP	229.04	227.29
SDM	160.26	158.51

The area of **2120 Marram dunes (white dunes)** has decreased by 68.78 ha since the baseline survey (Table 3.29). Most of the decrease in area was the result of natural processes, but erosion due to trampling at site 64 Barley Cove and beach cleaning at site 17 Brittas Bay resulted in loss of 0.2 ha. This is equal to loss of less than 1% since the baseline survey. The habitat was assessed as Unfavourable-Inadequate during the SDM.

Table 3.29: Loss of area of 2120 Marram dunes (white dunes) since the baseline survey

	Area (ha)	**Area (%)**
Loss due to natural processes	68.58	30.2
Loss due to anthropogenic factors	0.2	0.1
Total loss	68.78	30.3

During the baseline survey, Area was assessed as Unfavourable-Bad, but according to Ryle *et al.* (2009), this result was misleading because natural erosion was included in the calculation habitat loss.

3.4.2 Structure and Functions

The Structure and Functions of **2120 Marram dunes (white dunes)** were assessed at 35 sites. **2120 Marram dunes (white dunes)** were recorded at site 43 Grange, but the habitat eroded before the Structure and Functions could be assessed on a return visit**.** Table 3.30 shows the Structure and Functions assessments for each site where **2120 Marram dunes (white dunes)** were assessed. Twenty-one sites were assessed as Favourable, 13 as Unfavourable-Inadequate and one site was assessed as Unfavourable-Bad.

Table 3.30: The results of the Structure and Functions assessment at each site where 2120 Marram dunes (white dunes) habitat was assessed showing which of the criteria passed and failed. Favourable, Unfavourable-Inadequate and Unfavourable-Bad are abbreviated to F, U-I and U-B respectively.

Site no.	Positive indicator species	Rare species	Negative indicator species	Non-native species	Health of the vegetation	Alterations to sediment dynamics	Damage due to disturbance	Assessment
2	Pass	Pass	Pass	Pass	Pass	Fail	Fail	U-I
3	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
9	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
10	Pass	Pass	Pass	Pass	Pass	Fail	Pass	U-I
11	Pass	Pass	Pass	Fail	Pass	Fail	Fail	U-B
17	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
28	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
35	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
41	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
46	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
58	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
60	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
64	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
68	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
70	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
75	Pass	Pass	Pass	Pass	Pass	Fail	Pass	U-I
77	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
87	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
97	Pass	Pass	Pass	Pass	Pass	Fail	Fail	U-I
100	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
108	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
120	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
124	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
128	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F

Site no.	Positive indicator species	Rare species	Negative indicator species	Non-native species	Health of the vegetation	Alterations to sediment dynamics	Damage due to disturbance	Assessment
131	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
133	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
147	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
148	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
155	Pass	Pass	Pass	Pass	Pass	Fail	Pass	U-I
157	Pass	Pass	Pass	Pass	Pass	Fail	Pass	U-I
160	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
162	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
167	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
169	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
175	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F

Table 3.31 shows the failure rate for each criterion in the Structure and Functions assessment. Damage due to disturbance and alterations to the sediment dynamics (including coastal protection works) were the most frequent criteria to fail.

Table 3.31: The percentage of sites with 2120 Marram dunes (white dunes) at which each criterion failed in the Structure and Functions assessment.

Criterion	Failed (% of sites)
Positive indicator species	0.0
Rare species	0.0
Negative indicator species	0.0
Non-native species	2.9
Health of the vegetation	0.0
Alterations to sediment dynamics	20.5
Damage due to disturbance	29.4

Due to access difficulties, 1.75 ha could not be included in the survey. The total area included in the Structure and Functions assessment was 158.45 ha. Of the total sample area, 142.82 ha (90.1%) were assessed as Favourable and 15.63 ha (9.9%) were assessed as Unfavourable (Table 3.32). The Structure and Functions were assessed as Unfavourable-Inadequate.

Table 3.32: The total assessed area and percentage of area of 2120 Marram dunes (white dunes) in Favourable and Unfavourable condition in 2011/2012.

	Area (ha)	**Area (%)**
Favourable	142.82	90.1
Unfavourable	15.63	9.9

This is a more favourable assessment than the habitat received during the CMP, when it was assessed as Unfavourable-Bad, with the most important reason for this habitat to fail being the presence of unhealthy *Ammophila arenaria* in monitoring stops.

3.4.3 Future Prospects

Positive impacts were recorded at one site, neutral impacts were recorded at 23 sites and negative impacts were recorded at 21 sites. No impacts were recorded at four sites. The median impact score across all sites was 0, and the most negative score was -6.5.

Although artificial sediment stabilisation is frequently considered to be a negative impact, at one site it was recorded as a positive impact (Table 3.33). Anthropogenic disturbance and over grazing has resulted in anthropogenic erosion at site 108 Dooaghtry. A local landowner is promoting the spread of *Ammophila arenaria* into the affected areas, which has reduced the mobility of the sand.

Table 3.33: Positive impacts affecting 2120 Marram dunes (white dunes), the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	**Impact description**	**Percentage of sites affected:**				**Area affected (ha)**	**Area affected (% of total sample area)**
		Low intensity	**Medium intensity**	**High intensity**	**Total**		
J03.03	Reduction, lack or prevention of erosion	0.0	2.7	0.0	2.7	0.12	0.1

The neutral impact affecting the greatest area is erosion, which affects over 9% of the habitat (Table 3.34). Walking, horse-riding and non-motorised vehicles are the most frequent neutral impact. Old sea defences are less frequent but affect the same area, 2.6% of the habitat. Non-intensive sheep grazing and fences, paths and tracks each affect less than 1% of the habitat.

Table 3.34: The five neutral impacts affecting the greatest area of 2120 Marram dunes (white dunes), the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
K01.01	Erosion	5.4	16.2	13.5	35.1	14.81	9.2
G01.02	Walking, horse riding and non-motorised vehicles	35.1	5.4	0.0	40.5	4.16	2.6
J02.12.01	Sea defence or coast protection works, tidal barrages	2.7	5.4	5.4	13.5	4.10	2.6
A04.02.02	Non intensive sheep grazing	2.7	0.0	0.0	2.7	1.24	0.8
D01.01	Paths, tracks, cycling tracks	5.4	2.7	0.0	8.1	0.26	0.2

Negative impacts primarily associated with recreation (walking, horse-riding and non-motorised vehicles; trampling and overuse) affect the greatest area (Table 3.35). The other impacts presented in Table 3.35 relate to interference with sediment dynamics.

Table 3.35: The five negative impacts affecting the greatest area of 2120 Marram dunes (white dunes), the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
G01.02	Walking, horse riding and non-motorised vehicles	13.5	10.8	0.0	24.3	18.19	11.4
G05.01	Trampling, overuse	0.0	21.6	18.9	40.5	6.55	4.1
G05.05	Intensive maintenance of public parks /cleaning of beaches	2.7	2.7	0.0	5.4	3.18	2.0
J02.12.01	Sea defence or coast protection works, tidal barrages	5.4	5.4	2.7	13.5	2.54	1.6
C01.01.02	Removal of beach materials	0.0	0.0	2.7	2.7	0.62	0.4

Each of the negative impacts alone acted over a limited area, but they were sufficient to compromise the Structure and Functions of the habitat. Although positive impacts were recorded, they affected less than 1% of the habitat. The Future Prospects were assessed as Unfavourable-Bad during the CMP due to natural erosion and recreational pressures. Natural erosion was not considered by the SDM to be a negative impact unless exacerbated by human activities. As the conservation status of the habitat is likely to remain Unfavourable-Inadequate over the next 12 years, Future Prospects were assessed as Unfavourable-Inadequate during the SDM.

3.4.4 Conservation assessment

The conservation status of each of the parameters assessed during the SDM is presented in Table 3.36. Area was assessed as Unfavourable-Bad during the CMP, when loss due to natural erosion was included in the calculation of loss of area. The improvement in the assessment from Unfavourable-Bad to Unfavourable-Inadequate is considered to be the result of changes in the

assessment methodology. However, because habitat loss has continued to occur since the CMP, the trend was assessed as deteriorating.

During the baseline survey, the most important reason for this habitat to fail was the presence of unhealthy *Ammophila arenaria* in monitoring stops. During the SDM, **2120 Marram dunes (white dunes)** only failed this criterion if the presence of unhealthy *Ammophila arenaria* was linked to human activities, and not if it was part of the natural stabilisation processes affecting sand dune habitats. Because 90.1% of the habitat was assessed as Favourable, Structure and Functions were assessed as Unfavourable-Inadequate. The improvement in the Structure and Functions assessment is due to a change in the assessment methodology and trend was assessed as stable.

Several of the impacts recorded most frequently during the CMP featured in the list of impacts affecting the greatest area during the SDM. Erosion, trampling, walking, horse-riding and non-motorised vehicles, sea defences, paths and tracks and grazing were all noted at more than three sites during the CMP. Sea defences were more likely to be assessed as negative during the SDM than during the CMP, as any new interference in natural processes of accretion and erosion was considered to be a negative impact during the SDM. Natural erosion was cited as one of the main reasons for the Unfavourable-Bad Future Prospects rating given during the CMP, but this was considered a neutral impact during the SDM. The improvement in the Future Prospects rating noted during the SDM was related to changes in the methodology rather than genuine improvements and the trend was assessed as stable.

All of the assessment parameters were assessed as Unfavourable-Inadequate during the SDM. While the trend of Structure and Functions and Future Prospects were found to be stable, continued habitat loss meant that Area was deteriorating. The conservation assessment of **2120 Marram dunes (white dunes)** was assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Table 3.36: Results of the conservation status assessment of 2120 Marram dunes (white dunes).

Parameter	CMP assessment	SDM assessment	Trend
Area	Unfavourable-Bad	Unfavourable-Inadequate	Deteriorating
Structure and Functions	Unfavourable-Bad	Unfavourable-Inadequate	Stable
Future Prospects	Unfavourable-Bad	Unfavourable-Inadequate	Stable
Conservation assessment	Unfavourable-Bad	Unfavourable-Inadequate	Deteriorating

3.5 *2130 Fixed dunes (grey dunes)

3.5.1 Area and distribution

The distribution and area of ***2130 Fixed dunes (grey dunes)*** at sites surveyed during the SDM are shown in Figure 3.5 and Table 3.37. ***2130 Fixed dunes (grey dunes)*** habitat was recorded at 36 sites and sometimes occupied large areas, for example at site 70 Inch, where the fixed dunes extended to an area of 390.79 ha.

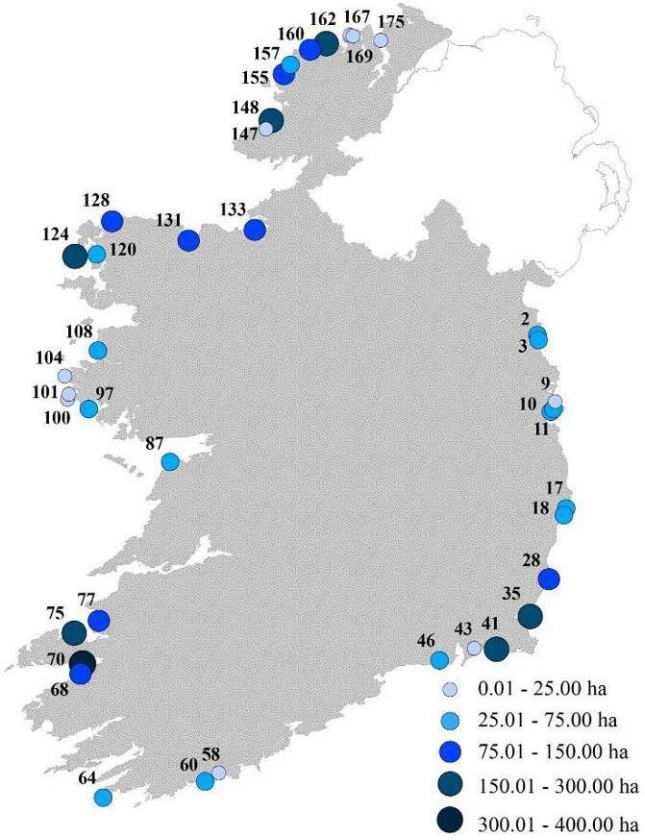

Figure 3.5: Distribution of SDM sites supporting *2130 Fixed dunes (grey dunes) with the area of the habitat indicated.

Table 3.37: Area of *2130 Fixed dunes (grey dunes) (surveyed and unsurveyed) on the revised CMP maps and the SDM maps.

Site no.	Site name	Revised CMP area (ha)	SDM Area (ha)
2	Baltray	31.75	38.80
3	Mornington	31.88	35.91
9	Portmarnock	9.27	15.34
10	North Bull Island	33.69	40.36
11	South Bull Island	56.70	65.38
17	Brittas Bay	55.55	54.83
18	Mizen Head	45.62	47.10
28	Cahore Point North	81.23	96.90
35	The Raven	26.67	31.78
41	Ballyteige	226.39	225.66
43	Grange	0.57	1.50
46	Tramore	66.04	68.90
58	Inchydoney	19.11	19.06
60	Castlefreke	28.19	28.75
64	Barley Cove	27.66	47.07
68	Rossbehy	98.90	78.08
70	Inch	352.33	390.79
75	Castlegregory	282.93	279.89
77	Banna Strand	138.57	140.51
87	Fanore	61.04	61.56
97	Dogs Bay	45.41	46.09
108	Dooaghtry	66.06	72.89
120	Doo Lough	44.63	46.35
124	Aghleam	292.78	294.42
128	Garter Hill	108.35	119.24
131	Bartragh	119.58	116.44
133	Strandhill	106.52	109.30
147	Maghera	20.96	23.06
148	Sheskinmore	246.27	250.05
155	Kincaslough	81.59	82.11
157	Derrybeg	30.05	30.80
160	Dooey	94.87	97.04
162	Rincleven	276.77	277.96
167	Tranarossan	11.66	13.45
169	Lough Nagreany	8.24	8.72
175	Crummies Bay	11.89	11.95

Areas at two subsites, site 212 Derryness (a subsite of site 148 Sheskinmore) and site 246 Tramore (a subsite of site 46 Tramore) were included in the areas presented in Table 3.37.

The area of ***2130 Fixed dunes (grey dunes)** mapped during the baseline survey, the Revised CMP area and the area mapped during the SDM are shown in Table 3.38. In total, 616.89 ha were labelled as unsurveyed during the SDM. The largest unsurveyed areas were at sites 70 Inch, 35 The Raven, 64 Barley Cove and 133 Strandhill. At site 64 Barley Cove, the unsurveyed area was not included on the revised CMP map because it was not clear whether it had been present but not mapped during the CMP, or whether the habitat had recovered in the interim. The main reasons for exclusion of parts of the habitat from the surveyed area were access difficulties and land use (conifer plantations). Unsurveyed areas were not included in the area assessment. Within the area labelled as unsurveyed in the GIS there is a large area of conifer plantation on a sandy substrate in site 35 The Raven (178.39 ha). After discussions with NPWS, this was discounted as ***2130 Fixed dunes (grey dunes)** as it was too altered to be considered as this habitat now. Therefore this figure was not used in any analysis of ***2130 Fixed dunes (grey dunes).**

Table 3.38: Area of *2130 Fixed dunes (grey dunes) within the sample sites as represented on different maps.

	Total mapped area (ha)	**Area used in calculation of change (ha)**
CMP area	3296.31	n/a
Revised CMP area	3239.72	2801.22
SDM area	3368.04	2929.54

Within the surveyed area, the total change in area was 128.32 ha (Table 3.39). Increases in area were recorded at 30 sites, though none appeared to be attributed to deliberate changes in management or conservation practises. There was also anthropogenic loss of 3 ha.

Table 3.39: Change in area of *2130 Fixed dunes (grey dunes) since the baseline survey.

	Area (ha)	**Area (%)**
Increase due to natural processes	131.32	4.7
Loss due to anthropogenic factors	3.00	0.1
Net change in area (increase)	128.32	4.6

The area of ***2130 Fixed dunes (grey dunes)** has increased by 131.32 ha since the baseline survey. However, there are eight sites where the habitat has decreased in size due to anthropogenic factors

(3.00 ha). At site 133 Strandhill, a sea wall has been built into the ***2130 Fixed dunes (grey dunes).** Damage associated with agriculture or recreation resulted in loss of habitat at site 17 Brittas Bay, site 64 Barley Cove, site 75 Castlegregory and 108 Dooaghtry. Erosion is most often considered to be one of the natural processes affecting sand dune systems. At site 108 Dooaghtry, there is a large eroding area between the ***2130 Fixed dunes (grey dunes)** and ***21A0 Machairs**. However, at this site, historic dumping and overgrazing have combined with the extreme weather conditions which affect the west of Ireland and have led to considerable erosion of the fixed dune area (4.09 ha). Although some erosion was present when the habitat was mapped during the CMP, the area affected was far lower. Loss in area at this site since the CMP was 1.68 ha. Tourism related developments such as car parks, holiday homes or caravan parks resulted in loss of habitat at site 28 Cahore Point North, site 68 Rossbehy and site 77 Banna Strand. In total, 0.1% of the habitat has been lost due to human activity over the last six years. Although this is a low rate of loss, some of the loss is likely to be permanent and in the absence of management at some sites, losses due to disturbance are likely to continue.

Area was assessed as Unfavourable-Inadequate during the CMP and, as less than 1% of the habitat has since been lost, the current assessment is Unfavourable-Inadequate.

3.5.2 Structure and Functions

Structure and Functions of ***2130 Fixed dunes (grey dunes)** were assessed at 36 sites. Parts of several sites were excluded from the Structure and Functions assessment because of access difficulties. In total, 2889.94 ha were included in the Structure and Functions assessment. Table 3.42 shows the Structure and Functions assessments for each site where ***2130 Fixed dunes (grey dunes)** habitat was assessed, including the individual criteria assessed. Five sites (14%) were assessed as Favourable, 21 (58%) were assessed as Unfavourable-Inadequate and 10 (28%) were assessed as Unfavourable-Bad.

Table 3.40 shows the percentage of sites at which each criterion failed in the Structure and Functions assessment. The criterion that failed most frequently was damage due to disturbance (failed at 58.3% of sites), followed by positive indicator species, negative indicator species and height of vegetation, all of which failed at over 38% of sites.

Table 3.40: The percentage of sites at which each criterion failed in the Structure and Functions assessment of *2130 Fixed dunes (grey dunes)

Criterion	Failed (% of sites)
Positive indicator species	41.7
Rare species	0.0
Negative indicator species	38.9
Non-native species	11.1
Tree/scrub cover	8.3
Encroachment from adjacent plantations	2.8
Vegetation height	38.9
Vegetation health	5.6
Bare ground	2.8
Alterations to sediment dynamics	11.1
Damage due to disturbance	58.3

The combined area of ***2130 Fixed dunes (grey dunes)** within the sample sites that was assessed as Favourable and Unfavourable during the SDM is presented in Table 3.41. Just under three quarters (74.91%) of the sample area assessed was in Favourable condition, but 25.1% was in Unfavourable condition. With over 25% of the habitat in Unfavourable condition, would generally be consistent with an assessment of Unfavourable-Bad. The value is very close to the threshold for an assessment of Unfavourable-Inadequate, however, and most of the habitat was assessed as being in Favourable or Unfavourable-Inadequate condition, so Structure and Functions were assessed as Unfavourable-Inadequate on expert judgement. Structure and Functions were assessed as Unfavourable-Bad during the CMP.

Table 3.41: The total assessed area and percentage of area of *2130 Fixed dunes (grey dunes) in Favourable and Unfavourable in 2011/2012.

	Area (ha)	Area (%)
Favourable	2164.9	74.91
Unfavourable	725.1	25.1

Table 3.42: Results of the Structure and Functions assessment for *2130 Fixed dunes (grey dunes) showing which of the criteria passed and failed. Target species refers to positive indicator species. Favourable, Unfavourable-Inadequate and Unfavourable-Bad are abbreviated to F, U-I and U-B respectively.

Site no.	Target species	Rare species	Negative indicator species	Non-native species	Tree/ shrub cover	Encroachment from adjacent plantations	Vegetation height	Vegetation health	Bare ground	Alterations to sediment dynamics	Damage due to disturbance	Assessment
2	Fail	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	U-I
3	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
9	Fail	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Fail	Fail	U-B
10	Pass	Pass	Pass	Fail	Pass	Pass	Fail	Pass	Pass	Pass	Fail	U-B
11	Fail	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Fail	U-B
17	Fail	Pass	Fail	Fail	Fail	Pass	Fail	Pass	Fail	Pass	Fail	U-B
18	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
28	Fail	Pass	Fail	Fail	Pass	Pass	Fail	Fail	Pass	Pass	Fail	U-B
35	Fail	Pass	Fail	Pass	Pass	Fail	Fail	Pass	Pass	Pass	Fail	U-B
41	Fail	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	U-I
43	Fail	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	U-I
46	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Pass	Pass	Fail	U-B
58	Fail	Pass	Fail	Pass	Pass	Pass	Fail	Fail	Pass	Pass	Fail	U-B
60	Fail	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	U-I
64	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	U-I
68	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
70	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
75	Fail	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	U-B
77	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I

Table 3.42 (cont.)

Site no.	Target species	Rare species	Negative indicator species	Non-native species	Tree/ shrub cover	Encroachment from adjacent plantations	Vegetation height	Vegetation health	Bare ground	Alterations to sediment dynamics	Damage due to disturbance	Assessment
87	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
97	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Fail	Pass	U-I
108	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	U-I
120	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
124	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
128	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
131	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
133	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	U-B
147	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	U-I
148	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	U-I
155	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Fail	Pass	U-I
157	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
160	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
162	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
167	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
169	Pass	Pass	Fail	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	U-I
175	Pass	Pass	Pass	Pass	Fail	Pass	Fail	Pass	Pass	Pass	Pass	U-I

3.5.3 *Future Prospects*

Positive impacts were recorded at 24 sites, neutral impacts were recorded at 36 sites and negative impacts were recorded at 35 sites. The median impact score for ***2130 Fixed dunes (grey dunes)** at sites was -5.9 and the lowest score of any site was -18.

Non-intensive grazing by cattle, horses and sheep had a positive impact on 42.9% of the ***2130 Fixed dunes (grey dunes)** area (Table 3.43). Hunting was recorded as a positive impact at two sites, and this refers to shooting of rabbits at overgrazed or rabbit-damaged sites. Rabbit grazing and burrowing was also recorded as a positive impact at five sites.

Table 3.43: The five positive impacts affecting the greatest area of *2130 Fixed dunes (grey dunes), the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
A04.02.01	Non intensive cattle grazing	8.1	8.1	0.0	16.2	908.21	27.0
A04.02.02	Non intensive sheep grazing	8.1	10.8	0.0	18.9	285.97	8.5
A04.02.03	Non intensive horse grazing	8.1	8.1	0.0	16.2	250.17	7.4
F03.01	Hunting	5.4	0.0	0.0	5.4	138.34	4.1
K04.05	Damage by herbivores (including game species)	5.4	8.1	0.0	13.5	96.76	2.9

Widespread neutral impacts include walking and horse-riding, non-intensive grazing, undergrazing and erosion (Table 3.44). Undergrazing is considered neutral where it is limited in extent as it contributes to the structural diversity of the habitat while also resulting in small areas of species poor habitat.

Table 3.44: The five neutral impacts affecting the greatest area of *2130 Fixed dunes (grey dunes), the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
G01.02	Walking, horse riding and non-motorised vehicles	37.8	18.9	0.0	56.8	363.38	10.8
A04.03	Abandonment of pastoral systems, lack of grazing	5.4	10.8	0.0	16.2	164.27	4.9
A04.02.02	Non intensive sheep grazing	0.0	2.7	0.0	2.7	119.24	3.5
K01.01	Erosion	8.1	16.2	16.2	40.5	111.05	3.3
A04.02.01	Non intensive cattle grazing	0.0	8.1	0.0	8.1	86.71	2.6

The negative impact which affected the greatest area was undergrazing (Table 3.45). The other negative impacts which affect a large area are agricultural intensification, problematic native species (such as bracken), conifer forestry adjacent to the habitat and trampling. Other negative impacts which affect over 1% of the habitat include damage by herbivores, succession, off-road driving, recreational activities including walking, non-native species and cattle grazing.

The negative impacts recorded are responsible for reducing structural diversity and species richness within ***2130 Fixed dunes (grey dunes)**, as well as causing disturbance. The sites at which the most serious impacts were recorded appear to have a history of disturbance and undergrazing which pre-dates the CMP. Future Prospects were assessed as Unfavourable-Bad during the CMP. On the basis of the sites surveyed during the SDM, it appears unlikely that current management will reverse the damage associated with the negative impacts listed in Table 3.45 over the next 12 years. It is likely that some of the impacts such as trampling and problematic native species will affect an increasingly wide area and become more severe if management is not put in place to control them. This would lead to deterioration in Structure and Functions, from Unfavourable-Inadequate to Unfavourable-Bad. Future Prospects were assessed as Unfavourable-Bad during the SDM.

Table 3.45: The five negative impacts affecting the greatest area of *2130 Fixed dunes (grey dunes), the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
A04.03	Abandonment of pastoral systems, lack of grazing	16.2	35.1	2.7	54.1	707.31	21.0
A02.01	Agricultural intensification	2.7	5.4	0.0	8.1	148.54	4.4
I02	Problematic native species	10.8	13.5	10.8	35.1	136.68	4.1
B02	Forest and plantation management & use	5.4	2.7	0.0	8.1	129.73	3.9
G05.01	Trampling, overuse	0.0	8.1	56.8	64.9	123.36	3.7

3.5.4 Conservation assessment

Area was assessed as Unfavourable-Inadequate due to a reduction of 0.1% since the CMP. The impacts recorded during the SDM, particularly those related to recreation, indicate that habitat loss due to human activities is likely to continue into the future. Because losses have continued to occur since the CMP, the trend is deteriorating.

Structure and Functions were assessed as Unfavourable-Inadequate on expert judgement, but they are at the more negative end of the scale. During the CMP, the criteria that failed most frequently were sward height, negative indicator species and positive indicator species. These criteria also failed frequently during the SDM. The criterion that failed most frequently during the SDM was damage due to disturbance, which was not assessed during the CMP. The habitat was assessed as Unfavourable-Bad in 2007 because 84% of the habitat was in Unfavourable condition and 22% of monitoring stops failed the assessment. It is likely the true area in Unfavourable condition was closer to 22% of the habitat if the monitoring stops were representative. When sites were surveyed during the Sand Dunes Monitoring project, there were indications that undergrazing and scrub encroachment had become more severe since the Coastal Monitoring Project, and the invasive species *Hippophae rhamnoides* was found to have extended its surface cover at some sites. The habitat now borders on having Unfavourable-Bad Structure and Functions. The trend is set as deteriorating.

The negative impacts recorded most frequently during the CMP were related to amenity use, agriculture and abandonment, and as such, they were broadly similar to those recorded during the CMP, but they now affect a greater area. The most likely result of the current management is an increase in the area of the habitat affected by scrub and bracken encroachment, rank vegetation, damage due to disturbance and invasive species, which would cause Structure and Functions to be assessed as Unfavourable-Bad in 12 years' time. Future Prospects were assessed as Unfavourable-Bad during the SDM. Trend is deteriorating because the negative impacts have resulted in increasing pressure on the habitat and this pressure is likely to become increasingly intense in the absence of mitigating management.

Area has remained Unfavourable-Inadequate since the CMP was carried out, but loss has continued to occur. Structure and Functions is now on the threshold of Unfavourable-Bad, which is believed to represent a deterioration of condition. Future Prospects have deteriorated as the pressure of impacts and activities has increased, resulting in loss of habitat and deterioration of habitat condition. As a result, the conservation status of ***2130 Fixed dunes (grey dunes)** was assessed as Unfavourable-Bad (deteriorating) during the SDM (Table 3.46).

Table 3.46: Results of the conservation assessment of *2130 Fixed dunes (grey dunes)

Parameter	**CMP assessment**	**SDM assessment**	**Trend**
Area	Unfavourable-Inadequate	Unfavourable-Inadequate	Deteriorating
Structure and Functions	Unfavourable-Bad	Unfavourable-Inadequate	Deteriorating
Future Prospects	Unfavourable-Bad	Unfavourable-Bad	Deteriorating
Conservation assessment	Unfavourable-Bad	Unfavourable-Bad	Deteriorating

3.6 *2140 Decalcified *Empetrum* Dunes

3.6.1 Area and distribution

This is a very scarce habitat in Ireland. ***2140 Decalcified *Empetrum* dunes** were found at only one site during the SDM: 148 Sheskinmore, but it was below the minimum mapping area (Figure 3.6). This represents a decrease since the CMP, when it was found at three sites (Table 3.47).

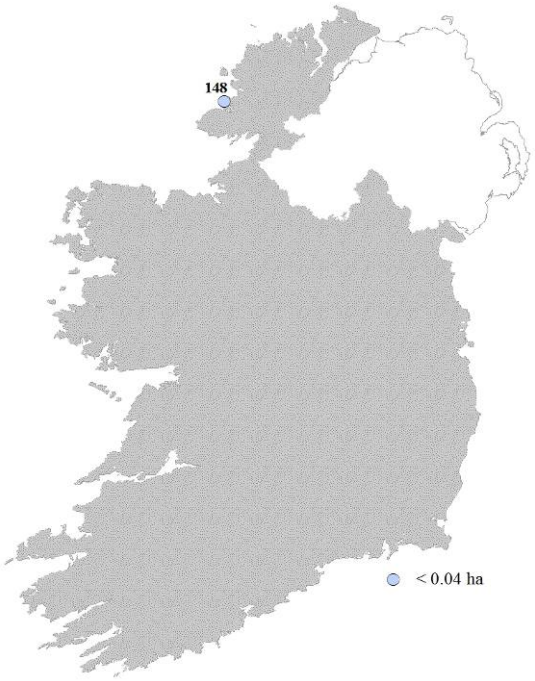

Figure 3.6: Location of site 148, Sheskinmore, where *2140 Decalcified *Empetrum* dunes were found during the SDM with the area of the habitat indicated.

Table 3.47: Area of *2140 Decalcified *Empetrum* dunes (surveyed and unsurveyed) on the revised CMP maps and the SDM maps.

Site no.	Site name	Revised CMP area (ha)	SDM Area (ha)
147	Maghera	0.47	0.0
148	Sheskinmore	0.63	<0.04
175	Crummies Bay	0.02	0.0

The baseline area was revised (Table 3.48) because part of the area included in the baseline survey consisted of heath growing on shallow base-rich or neutral sand over siliceous rock, and this was not considered to conform to ***2140 Decalcified *Empetrum* dunes** during the SDM. During the CMP, ***2140 Decalcified *Empetrum* dunes** habitat was recorded at site 147 Maghera. Although dune heath is still found at that site, only one *Empetrum nigrum* plant was found during the SDM, so the area was mapped as ***2150 Decalcified dune heath**.

Table 3.48: Area of *2140 Decalcified *Empetrum* dunes within the sample sites as represented on different maps.

	Area (ha)
CMP area	1.26
Revised CMP area	1.12
SDM area	<0.04

No clear anthropogenic loss was observed in this habitat (Table 3.49); however, the loss of ***2140 Decalcified *Empetrum* dunes** at site 147 Maghera was considered to be a negative development. Although there was no clear anthropogenic reason for the loss, it could signal that the management of the habitat is not suitable.

Table 3.49: Loss of area of *2140 Decalcified *Empetrum* dunes since the baseline survey

	Area (ha)	**Area (%)**
Loss due to natural processes	>1.08	>96.4
Loss due to anthropogenic factors	0.00	0.0
Total loss	>1.08	>96.4

The reason for loss of habitat, in particular at Maghera (0.47 ha), could not be firmly established during the survey in 2012. Further research may lead to a more definitive explanation on whether loss of habitat was natural or anthropogenic in nature. As we can't confirm that loss of area is due to anthropogenic factors at Maghera, the previous assessment of Area as Favourable by the CMP is adopted here.

3.6.2 Impacts and activities

No impacts were recorded for this habitat, although undergrazing was recorded in its former location, site 147 Maghera.

No conservation assessment was carried out for this habitat.

3.7 *2150 Decalcified Dune Heath

3.7.1 Area and distribution

***2150 Decalcified dune heath** is an unusual habitat in Ireland that was found occurring at four sites during the SDM. Most of the sites with this habitat are in the north-west of the country, but the habitat also occurs at site 17 Brittas Bay (

Figure 3.7). The largest area was recorded at site 148 Sheskinmore (Table 3.50).

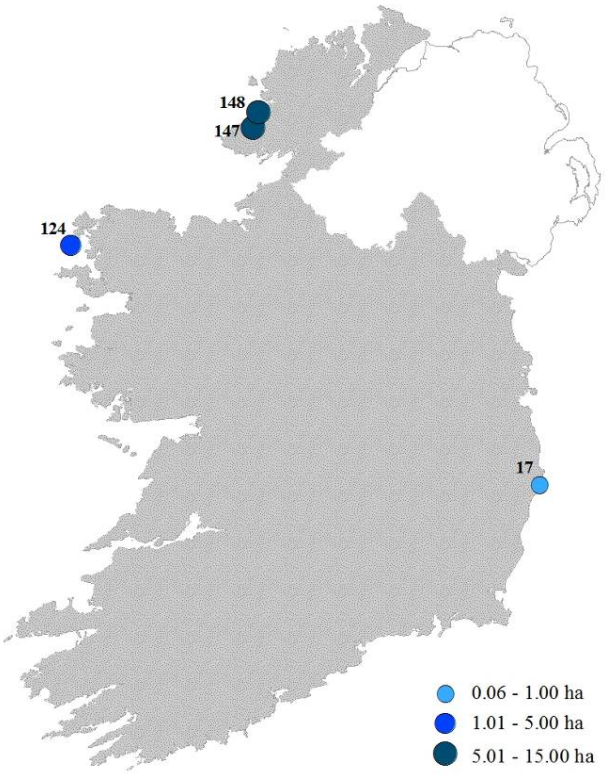

Table 3.50: Area of *2150 Decalcified dune heath (surveyed and unsurveyed) on the revised CMP maps and the SDM maps.

Site no.	Site name	Revised CMP area (ha)	SDM area (ha)
17	Brittas Bay	0.81	0.26
124	Aghleam	1.91	4.09
147	Maghera	11.91	13.14
148	Sheskinmore	13.39	14.03

Figure 3.7: Distribution of SDM sites supporting *2150 Decalcified dune heath with the area of the habitat indicated.

During the CMP, some areas which contained heath vegetation at the interface between shallow sand and acidic bedrock were included in this habitat. During the SDM, heath communities which were found in association with acidic bedrock close to the surface were not considered to conform to ***2150 Decalcified dune heath.** The reduction in area from 66.73 ha to 28.02 ha after the baseline area was revised (Table 3.51) is the result of the exclusion of areas which consisted of shallow sand over acidic bedrock, ***2130 Fixed dunes (grey dunes)** and flush. The area at site 148 Sheskinmore, in particular, was revised downwards considerably as much of the habitat which had previously been mapped there was found to be composed of a mosaic of bare rock, heath, flush and **5130 *Juniperus communis* formations on heath or calcareous grasslands**. At Sheskinmore, part of the habitat which had been mapped during the CMP was inaccessible because of the presence of a bull. As a result, 11.33 ha were not surveyed, and the presence of the habitat could not be confirmed. Given the character of the adjoining land, it is very likely that this part of the site is at least partially composed of non-dune habitats, but it is likely to contain **5130 *Juniperus communis* formations on heath or calcareous grasslands.**

Table 3.51: Area of *2150 Decalcified dune heath within the sample sites as represented on different maps.

	Area (ha)
CMP area	66.73
Revised CMP area	28.02
SDM area	31.52

Table 3.50 indicates that there has been an increase in the habitat area at three sites. At Maghera and Sheskinmore, this is due to the loss of *Empetrum nigrum* from two areas of heath, so that the habitat has changed from ***2140 Decalcified *Empetrum* dunes** to ***2150 Decalcified dune heath**. At Aghleam, the apparent increase is misleading. An area composed of a mosaic of exposed rock, dry heath and ***2150 Decalcified dune heath** was mapped in the south of the site. Because it is not clear how much of the substrate is truly decalcified and how much acidic rock is close to the surface but hidden by

overlying sand and vegetation, it was not possible to ascribe a percentage of the habitat which is occupied by true ***2150 Decalcified dune heath** within the mosaic. Mosaic habitats cannot be recorded on the revised CMP map, so the area with the most bare rock was labelled as dry heath while the area with the greatest cover of vegetation was labelled as ***2150 Decalcified dune heath.** It is considered unlikely that there has been a significant change in the area of the habitat at this site. Undergrazing and bracken encroachment have resulted in the loss of 0.68 ha of ***2150 Decalcified dune heath** from site 17 Brittas Bay, and this is considered to be anthropogenic loss. There was however, also a slight increase in area of this habitat at this site. The anthropogenic loss of area is less than 1% per year (Table 3.52). Area was assessed as Unfavourable-Inadequate.

Table 3.52: Change in area of *2150 Decalcified dune heath since the baseline survey

	Area (ha)	Area (%)
Increase in area	2.82	10.1
Loss due to anthropogenic factors	0.68	2.4
Net change in area (increase)	3.50	12.5

3.7.2 Impacts and activities

Negative impacts were noted at two sites, neutral impacts were noted at two sites and positive impacts were recorded at one site. At a single site, no impacts were noted. The median impact score was -1.5 and the most negative impact score at any site was -6. The positive, neutral and negative impacts recorded for ***2150 Decalcified dune heath** are shown in Table 3.53, Table 3.54 and Table 3.55.

Non-intensive sheep grazing was noted as a positive impact at site 147 Maghera.

Table 3.53: The positive impacts affecting *2150 Decalcified dune heath, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
A04.02.02	Non-intensive sheep grazing	25.0	0.0	0.0	25.0	13.14	41.7

Non-intensive cattle grazing, walking and horse riding, and rabbit activity were noted as neutral impacts. Although rabbits damage the substrate by burrowing, light grazing can reduce the rate of succession towards scrub.

Table 3.54: The neutral impacts affecting *2150 Decalcified dune heath, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
A04.02.01	Non-intensive cattle grazing	25.0	0.0	0.0	25.0	14.03	44.5
G01.02	Walking, horseriding and non-motorised vehicles	25.0	0.0	0.0	25.0	0.70	2.2
K04.05	Damage by herbivores (including game species)	25.0	0.0	0.0	25.0	0.66	2.1

Bracken and scrub encroachment were recorded as negative impacts, with sites 17 Brittas Bay and 147 Maghera affected. Lack of grazing at site 17 Brittas Bay facilitated succession to scrub. The other impacts recorded were associated with recreational use of the dunes.

Table 3.55: Negative impacts affecting *2150 Decalcified dune heath, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
I02	Problematic native species	0.0	25.0	0.0	25.0	1.31	4.2
K02.01	Species composition change (succession)	0.0	25.0	25.0	50.0	0.91	2.9
A04.03	Abandonment of pastoral systems, lack of grazing	0.0	25.0	0.0	25.0	0.26	0.8
G05	Other human intrusions and disturbances	0.0	0.0	25.0	25.0	0.13	0.4
H05.01	Garbage and solid waste	25.0	0.0	0.0	25.0	0.13	0.4

The impacts noted during the SDM were primarily related to agriculture and recreation. Most of the impacts listed in the CMP report relate to agriculture, but recreation is cited as a threat. Bracken encroachment was recorded in this habitat during the CMP, and this remains a problem.

No conservation assessment was carried out for this habitat.

3.8 2170 Dunes with creeping willow

3.8.1 Area and distribution

2170 Dunes with creeping willow habitat were recorded at 14 of the 39 sites surveyed during the SDM. Although it occurs on both the west and east coasts, all of the sites where it covers an area of over 5 ha are on the west coast (Figure 3.8). Table 3.56 shows the area of the habitat at the sites where it was recorded during the CMP and SDM. The site with the greatest area of **2170 Dunes with creeping willow** is site 124 Aghleam, followed closely by site 75 Castlegregory.

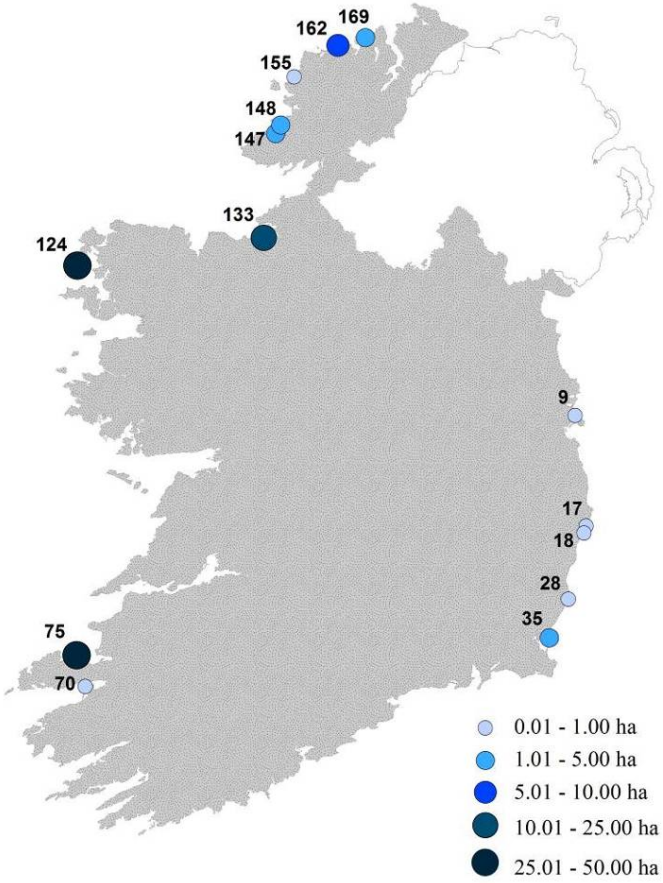

Figure 3.8: Distribution of SDM sites supporting 2170 Dunes with creeping willow with the area of the habitat indicated.

Table 3.56: Area of 2170 Dunes with creeping willow (surveyed and unsurveyed) on the revised CMP maps and the SDM maps.

Site no.	Site name	Revised CMP area (ha)	SDM area (ha)
9	Portmarnock	0.039	0.039
17	Brittas Bay	0.08	0.13
18	Mizen Head	0.07	0.07
28	Cahore Point North	0.07	0.07
35	The Raven	2.57	2.77
70	Inch	0.34	0.34
75	Castlegregory	29.20	38.58
124	Aghleam	39.43	39.43
133	Strandhill	11.28	11.26
147	Maghera	3.12	3.12
148	Sheskinmore	2.50	2.50
155	Kincaslough	0.03	0.03
162	Rinclevan	9.04	9.04
169	Lough Nagreany	1.83	1.83

The areas of **2170 Dunes with creeping willow** mapped during the baseline survey, the revised baseline area and the area mapped in 2011/2012 are shown in Table 3.57. The 109.21 ha of **2170 Dunes with creeping willow** represented in the SDM habitat maps includes 0.87 ha which was not surveyed due to access issues or because it was within a conifer plantation. Unsurveyed areas were not included in the area assessment. The total area which was included in the change in area calculation is shown in Table 3.57.

Table 3.57: Area of 2170 Dunes with creeping willow within the sample sites as represented on different maps.

	Total mapped area (ha)	**Area included in calculation of change (ha)**
CMP area	97.97	n/a
Revised CMP area	99.60	98.73
SDM area	109.21	108.34

The area of **2170 Dunes with creeping willow**, as shown in Table 3.58, has increased by 9.61 ha since the baseline survey. This may be a slight overestimate of the actual increase as this habitat is difficult to identify from aerial photographs, so some of the newly mapped areas may have been present during the baseline survey. There has been no clear anthropogenic loss of area. Although Area was reported to be Unfavourable-Inadequate during the CMP, the 2007 National Conservation Assessment assessed Area as Favourable. In the absence of any clear evidence of loss since the Habitats Directive came into force, Area was assessed as Favourable.

Table 3.58: Change in area of 2170 Dunes with creeping willow since the baseline survey

	Area (ha)	**Area (%)**
Increase due to natural processes	9.61	9.7
Loss due to anthropogenic factors	0.00	0.0

3.8.2 Structure and Functions

Although **2170 Dunes with creeping willow** habitat was mapped at 14 sites, it was only included in the Structure and Functions assessment at nine sites. Access difficulties meant that only part of the habitat at site 75 Castlegregory could be accessed, and none of the habitat at site 70 Inch. **2170 Dunes with creeping willow** was below the minimum monitoring area at site 9 Portmarnock (0.039 ha) and site 155 Kincaslough (0.03 ha). At three sites, the habitat was mapped in small fragmented patches and so the area was underestimated by the field team and no monitoring stops were carried out. In total, 95.11 ha were included in the Structure and Functions assessment.

Table 3.59 shows the percentage of sites at which each criterion failed in the Structure and Functions assessment. The criterion which failed most frequently was the height of *Salix repens*, which failed the assessment at 44.4% of sites. The presence of negative indicator species failed at a

third of sites, and the criteria for tree or scrub cover (not including *S. repens*) and the amount of bare ground failed at 22.2% of sites assessed.

Table 3.59: The percentage of sites at which each criterion failed in the Structure and Functions assessment of 2170 Dunes with creeping willow.

Criterion	**Failed (% of sites)**
Positive indicator species	0.0
Rare species	0.0
Negative indicator species	33.3
Non-native species	0.0
Indicators of rank conditions	0.0
Tree/scrub cover	22.2
Height of *Salix repens*	44.4
Bare ground	22.2
Alterations to sediment dynamics	0.0
Damage due to disturbance	0.0

Table 3.60 shows the Structure and Functions assessments for each site where **2170 Dunes with creeping willow** habitat was assessed. Two sites were assessed as Favourable and seven as Unfavourable-Inadequate.

Table 3.60: Results of the Structure and Functions assessment at each site where 2170 Dunes with creeping willow habitat was assessed showing which of the criteria passed and failed. Favourable, Unfavourable-Inadequate and Unfavourable-Bad are abbreviated to F, U-I and U-B respectively.

Site no.	Positive indicator species	Rare species	Negative indicator species	Non-native species	Indicators of rank conditions	Tree/ scrub cover	Height of *Salix repens*	Bare ground	Alterations to sediment dynamics	Damage due to disturbance	Assessment
28	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Pass	Pass	U-I
35	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Pass	Pass	Pass	U-I
75	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	U-I
124	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	U-I
133	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Fail	Pass	Pass	U-I
147	Pass	Pass	Fail	Pass	Pass	Pass	Fail	Pass	Pass	Pass	U-I
148	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
162	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	U-I
169	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F

Table 3.61 shows the area and percentage of the sampled area for which Structure and Functions were assessed as Favourable and Unfavourable. Almost 80% of the habitat was assessed as Favourable, while 20.8% of the habitat was assessed as Unfavourable. Structure and Functions were assessed as Unfavourable-Inadequate during the baseline survey. The SDM assessment of Structure and Functions of **2170 Dunes with creeping willow** was also Unfavourable-Inadequate.

Table 3.61: The total assessed area and percentage of area of 2170 Dunes with creeping willow in Favourable and Unfavourable condition in 2011/2012.

	Area (ha)	**Area (%)**
Favourable	78.69	79.2
Unfavourable	22.09	20.8

3.8.3 Future Prospects

Positive impacts were recorded at 7 sites, neutral impacts were recorded at five sites and negative impacts were recorded at nine sites. The median impact score across all sites irrespective of habitat area was -0.125 and the lowest score any site achieved was -4.75.

Five positive impacts were recorded on **2170 Dunes with creeping willow** (Table 3.62). Four of the five positive impacts related to non-intensive grazing by livestock.

Table 3.62: Positive impacts affecting 2170 Dunes with creeping willow, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	**Impact description**	**Percentage of sites affected:**				**Area affected (ha)**	**Area affected (% of total sample area)**
		Low intensity	**Medium intensity**	**High intensity**	**Total**		
A04.02.01	Non intensive cattle grazing	7.1	21.4	0.0	28.6	38.64	35.4
A04.02.05	Non intensive mixed animal grazing	7.1	0.0	0.0	7.1	25.63	23.5
A04.02.02	Non intensive sheep grazing	7.1	0.0	0.0	7.1	3.12	2.9
B02.02	Forestry clearance	7.1	0.0	0.0	7.1	0.14	0.1
A04.02.03	Non intensive horse grazing	7.1	0.0	0.0	7.1	0.07	0.1

Neutral impacts recorded on **2170 Dunes with creeping willow** were walking and horse-riding, paths and tracks and fences (Table 3.63). The presence of tracks and walkers or riders can result in disturbance and damage, but it also helps to slow the development of rank vegetation in ungrazed areas.

Table 3.63: Neutral impacts affecting 2170 Dunes with creeping willow, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
G01.02	Walking, horse riding and non-motorised vehicles	14.3	7.1	0.0	21.4	0.97	0.9
G05.09	Fences, fencing	0.0	14.3	0.0	14.3	0.48	0.4
D01.01	Paths, tracks, cycling tracks	0.0	7.1	0.0	7.1	0.09	0.1

Table 3.64: The five negative impacts affecting the greatest area of 2170 Dunes with creeping willow, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
A02.01	Agricultural intensification	7.1	0.0	0.0	7.1	19.29	17.7
A04.03	Abandonment of pastoral systems, lack of grazing	14.3	28.6	0.0	42.9	17.36	15.9
B02	Forest and plantation management & use	14.3	0.0	0.0	14.3	11.08	10.1
I01	Invasive non-native species	7.1	7.1	7.1	21.4	3.34	3.1
A04.02.01	Non intensive cattle grazing	7.1	0.0	0.0	7.1	1.81	1.7

The top five negative impacts include three which relate to agriculture, and these relate to unfavourable management regimes and lack of management (Table 3.64). Invasive non-native species and forestry management also have a negative impact, and these are sometimes related as adjacent forestry can act as a seed source for non native species which can spread into the **2170 Dunes with creeping willow**.

The positive impacts on the habitat are likely to maintain the area which is currently in Favourable condition, but are not expected to extend to areas currently assessed as Unfavourable. Future Prospects were assessed as Unfavourable-Inadequate during the CMP. This assessment has not changed, and Future Prospects were assessed as Unfavourable-Inadequate during the SDM.

3.8.4 Conservation assessment

Table 3.65 shows the conservation assessment of **2170 Dunes with creeping willow** during the SDM. No loss of area was recorded during the SDM. Area was assessed as Favourable in the National Conservation assessment in 2007, which indicates that loss of area had not occurred between implementation of the Habitats Directive and 2007. The NCA is considered to be the definitive assessment of the habitat, and it overrides the Unfavourable-Inadequate assessment given in the CMP report. Area was assessed as Favourable (stable) during the SDM.

The criteria assessing presence of negative indicator species, cover of trees and scrub, cover of bare ground and height of *Salix repens* failed during the SDM assessment, and the habitat was assessed as Unfavourable-Inadequate. Negative indicator species, typical species and cover of broad-leaved grasses failed in assessments during the CMP. All of the monitoring stops passed during the CMP, but the habitat was assessed as Unfavourable-Inadequate because 1% of the habitat was considered to be in poor condition. Although this appears to be a more positive assessment than the SDM reported, it is likely that the difference is partly related to a change in the methodology. Only four of the six criteria had to pass within each monitoring stop for the habitat to pass during the CMP. If a single criterion failed at the majority of monitoring stops within a site, the habitat would still have been assessed as Favourable during the CMP, while it would have been assessed as Unfavourable-Inadequate during the SDM. Absence of bare ground was not a reason for failure during the CMP. During the SDM, a small amount of bare ground was a requirement for the habitat to pass as absence of bare ground is a sign of over-stabilisation and results in reduced habitat and species diversity. This difference in the methodology helps to explain why the criterion passed at all stops during the CMP. The size of trees and scrub observed during the SDM implies that they were almost certainly present during the CMP, so the fact that all of the monitoring stops passed this criterion is most likely to be related to the positioning of the stops.

The apparent deterioration in the Structure and Functions assessment is at least partly the result of changes in methodology, so the trend was assessed as stable.

The current impacts and activities affecting **2170 Dunes with creeping willow** were all identified during the baseline survey. Then, as now, the most important impacts related to agriculture (including undergrazing). There has been no significant change in the impacts affecting sites. Without management, it is likely that there will be some increase in scrub encroachment, but this is not predicted to result in a deterioration of the habitat to Unfavourable-Bad condition within the next 12 years. Future Prospects were assessed as Unfavourable-Inadequate during the SDM, and the trend was stable.

Although the Area assessment was Favourable, the Structure and Functions and Future Prospects assessments have remained Unfavourable-Inadequate since the baseline survey. The conservation status of **2170 Dunes with creeping willow** was assessed as Unfavourable-Inadequate (stable) during the SDM (Table 3.65).

Table 3.65: Results of the conservation assessment of 2170 Dunes with creeping willow.

Parameter	**CMP assessment**	**SDM assessment**	**Trend**
Area	Unfavourable-Inadequate	Favourable	Stable
Structure and Functions	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable
Future Prospects	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable
Conservation assessment	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable

3.9 2190 Humid dune slacks

3.9.1 Area and distribution

2190 Humid dune slacks were recorded at 29 of the 39 sites included in the SDM. They are distributed evenly around the coast (Figure 3.9) and larger slacks tend to be associated with sites where there are large, expansive areas of ***2130 Fixed dunes (grey dunes).** Slacks were no longer present at two sites where they were recorded during the CMP, site 3 Mornington and site 43 Grange (Table 3.66) Areas at site 246 Tramore (a subsite of site 46 Tramore) were included in the areas presented in Table 3.66

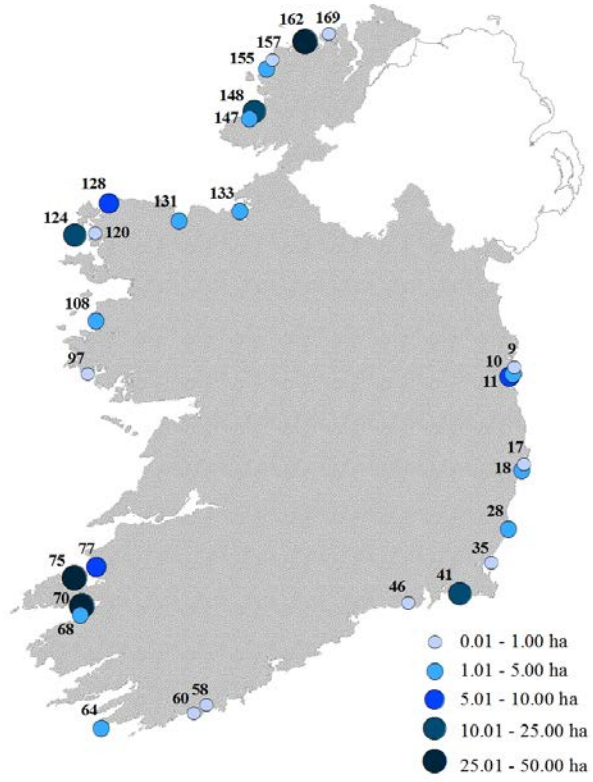

Figure 3.9: Distribution of SDM sites supporting 2190 Humid dune slacks with the area of the habitat indicated.

Table 3.66: Area of 2190 Humid dune slacks (surveyed and unsurveyed) on the revised CMP maps and the SDM maps.

Site no.	Site name	Revised CMP area (ha)	SDM area (ha)
3	Mornington	0.93	0.00
9	Portmarnock	0.87	0.31
10	North Bull Island	3.04	2.96
11	South Bull Island	8.40	9.15
17	Brittas Bay	0.83	0.34
18	Mizen Head	4.76	4.76
28	Cahore Point North	2.28	2.28
35	The Raven	0.15	0.15
41	Ballyteige	17.93	17.68
43	Grange	2.76	0.00
46	Tramore	0.25	0.25
58	Inchydoney	0.28	0.28
60	Castlefreke	0.15	0.15
64	Barley Cove	4.59	4.59
68	Rossbehy	1.91	1.60
70	Inch	32.36	32.36
75	Castlegregory	32.29	27.60
77	Banna Strand	5.31	5.29
97	Dogs Bay	0.10	0.10
108	Dooaghtry	2.00	2.00
120	Doo Lough	1.56	0.54
124	Aghleam	24.94	24.85
128	Garter Hill	5.97	5.88
131	Bartragh	1.67	1.67
133	Strandhill	1.88	2.00
147	Maghera	1.10	1.10
148	Sheskinmore	7.57	12.85
155	Kincaslough	1.09	1.09
157	Derrybeg	0.19	0.19
162	Rincleven	42.57	42.57
169	Lough Nagreany	0.72	0.72

The area of **2190 Humid dune slacks** mapped during the baseline survey, the revised baseline area and the area mapped in 2011/2012 are shown in Table 3.67.

Because of access difficulties, parts of the habitat at sites 70 Inch and 75 Castlegregory could not be surveyed and were excluded from the Area assessment. The area excluded amounted to 32.39 ha. The areas included in the change in area calculation are presented in Table 3.67.

Table 3.67: Area of 2190 Humid dune slacks within the sample sites as represented on different maps.

	Total mapped area (ha)	**Area used in calculation of change (ha)**
CMP area	159.23	n/a
Revised CMP area	210.45	178.06
SDM area	205.31	172.92

The total area of **2190 Humid dune slacks** (Table 3.68) decreased between the CMP and the SDM by 5.14 ha. The site with the largest loss was site 75 Castlegregory, where 4.69 ha were lost. This area was only briefly viewed because of the presence of a bull, but it appeared to consist of a mosaic of **2170 Dunes with creeping willow** and **2190 Humid dune slacks,** where **2170 Dunes with creeping willow** was dominant. The cover of each habitat could not be determined so the dominant habitat, **2170 Dunes with creeping willow**, was mapped as having 100% cover**.** The cause of the succession could not be determined, but there was no clear evidence that it was the result of human activities. There were indications that human activity was likely to have resulted in loss of 1.36 ha at two sites on the east coast, site 3 Mornington and site 17 Brittas Bay. There was evidence of development of new dune slacks at only three sites visited in 2011/2012: sites 133 Strandhill, 148 Sheskinmore and 124 Aghleam.

Table 3.68: Loss of area of 2190 Humid dune slacks since the baseline survey.

	Area (ha)	**Area (%)**
Total loss since CMP	5.14	2.9
Loss due to anthropogenic factors	1.36	0.8

Area was assessed as Unfavourable-Inadequate during the CMP. Loss of area continued in the period between the SDM and the CMP, but was equal to less than 1% per year. Area was assessed as Unfavourable-Inadequate during the SDM.

3.9.2 Structure and Functions

Structure and Functions were assessed at 28 sites, as it was not possible to access the dune slacks at site 70 Inch. Additionally, parts of two other sites were excluded from the Structure and Functions assessment because of access difficulties. In total, 172.45 ha were included in the Structure and Functions assessment. The criterion which failed at the most sites was positive indicator species, and this was generally an indication of rank conditions (Table 3.69). Cover of scrub, the ratio of broadleaved herbs to grasses, bare ground and damage due to disturbance each failed at four sites. Cover of bryophytes was insufficient at one site, and the cover of non-native species was excessive at another.

Table 3.69: The percentage of sites at which each criterion failed in the Structure and Functions assessment of 2190 Humid dune slacks.

Criterion	**Failed (% of sites)**
Positive indicator species	17.9
Rare species	0.0
Bryophyte cover	3.6
Cover of *Salix repens*	0.0
Negative indicator species	0.0
Non-native species	3.6
Cover of scrub	14.3
Forb:grass ratio	14.3
Bare ground	14.3
Alterations to sediment dynamics	0
Damage due to disturbance	14.3

Table 3.70 shows the Structure and Functions assessments for each site where **2190 Humid dune slacks** was assessed including the individual criteria assessed. The habitat was assessed as Favourable at 12 sites, Unfavourable-Inadequate at 14 sites and Unfavourable-Bad at two sites.

Table 3.70: Results of the Structure and Functions assessment at each site where 2190 Humid dune slacks were assessed showing which of the criteria passed and failed. Favourable, Unfavourable-Inadequate and Unfavourable-Bad are abbreviated to F, U-I and U-B respectively.

Site no.	Positive indicator species	Rare species	Bryophyte cover	Cover of *Salix repens*	Negative indicator species	Non-native species	Cover of scrub	Forb: grass ratio	Bare ground	Alterations to sediment dynamics	Damage due to disturbance	Structure and Functions
9	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	U-I
10	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	U-I
11	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	U-I
17	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	U-I
18	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	U-I
28	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	U-I
35	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
41	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
46	Fail	Pass	Fail	Pass	Pass	Pass	Fail	Pass	Fail	Pass	Pass	U-B
58	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
60	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
64	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Pass	Pass	U-B
68	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
75	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
77	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	U-I
97	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
108	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F

Table 3.70 (cont.)

Site	Positive	Rare	Bryophyte	Cover of	Negative	Non-native	Cover	Forb: grass	Bare	Alterations to	Damage due to	Structure
120	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
124	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
128	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	U-I
131	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
133	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
147	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
148	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Pass	Pass	U-I
155	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
157	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	U-I
162	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
169	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Pass	U-I

The combined area of **2190 Humid dune slacks** in the sample sites which was assessed as Favourable or Unfavourable is presented in Table 3.71. Over 90% of the habitat is in Favourable condition, which is very similar to the percentage assessed as Favourable during the baseline survey, and the Structure and Functions for the habitat are assessed as Unfavourable-Inadequate for the SDM.

Table 3.71: The total assessed area and percentage of area of 2190 Humid dune slacks in Favourable and Unfavourable condition in 2011/2012.

	Area (ha)	**Area (%)**
Favourable	158.56	91.9
Unfavourable	13.89	8.1

3.9.3 Future Prospects

Positive impacts were recorded at eleven sites, neutral impacts were recorded at 18 sites, negative impacts were recorded at 21 sites, and at one site, site 70 Inch, no impacts were recorded at all. The median impact score across all sites irrespective of habitat area was -2.63 and the most negative impact score at any site was -11.

Five positive impacts were recorded in **2190 Humid dune slacks.** Four of these were forms of non-intensive grazing (Table 3.72), while scrub removal was recorded as a positive impact at one site (site 10 North Bull Island).

Table 3.72: Positive impacts affecting 2190 Humid dune slacks, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
A04.02.01	Non intensive cattle grazing	10.3	13.8	0.0	24.1	102.39	49.9
A04.02.03	Non intensive horse grazing	3.4	6.9	0.0	10.3	21.65	10.5
A04.02.05	Intensive mixed animal grazing	3.4	0.0	0.0	3.4	7.45	3.6
A04.02.02	Non intensive sheep grazing	3.4	3.4	0.0	6.9	2.77	1.4
A10.01	Removal of hedges and copses or scrub	0.0	0.0	3.4	3.4	0.44	0.2

Neutral impacts included grazing by domestic animals, non-intensive recreational activities and golf courses which were found adjacent to the sites (Table 3.73). Grazing by domestic animals is considered to be neutral if the positive impacts are offset by negative aspects such as poaching.

Table 3.73: The five neutral impacts and activities affecting the greatest area of 2190 Humid dune slacks, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
G01.02	Walking, horse riding and non-motorised vehicles	31.0	10.3	0.0	41.4	9.17	4.5
A04.02.01	Non intensive cattle grazing	6.9	3.4	0.0	10.3	8.65	4.2
A04.02.02	Non intensive sheep grazing	6.9	0.0	0.0	6.9	7.88	3.8
G01.08	Other outdoor sports and leisure activities	3.4	0.0	0.0	3.4	5.88	2.9
G02.01	Golf course	10.3	0.0	0.0	10.3	4.42	2.2

Three of the most widespread of the negative impacts were generally associated with agriculture, and these included the use of dune slacks to water cattle, undergrazing and trampling near artificial ponds (Table 3.74). The use of artificial ponds for watering livestock in **2190 Humid dune slacks** was the main form of water abstraction recorded during the SDM, but water abstraction was also associated with domestic use and tourism (holiday homes and caravan parks). Drying out was considered to be a negative impact when it was accelerated by human activities.

Table 3.74**:** The five negative impacts and activities affecting the greatest area of 2190 Humid dune slacks, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
J02.07.01	Groundwater abstractions for agriculture	0.0	3.4	0.0	3.4	17.68	8.6
A04.03	Abandonment of pastoral systems, lack of grazing	10.3	13.8	3.4	27.6	10.94	5.3
J02.07	Water abstractions from groundwater	3.4	3.4	0.0	6.9	7.04	3.4
G05.01	Trampling, overuse	0.0	3.4	0.0	3.4	4.14	2.0
K01.03	Drying out	3.4	17.2	0.0	20.7	3.37	1.6

The impacts and activities recorded during the SDM were very similar to those recorded during the CMP. On the basis of these impacts, Area and Structure and Functions are expected to remain in Unfavourable-Inadequate conservation status for the foreseeable future, so the Future Prospects were assessed as Unfavourable-Inadequate during the SDM.

3.9.4 Conservation assessment

Area was assessed as Unfavourable-Inadequate during the CMP because of an estimated loss of 0.23% over the preceding 10 years. The loss of 1.36 ha (0.8%) of the area of **2190 Humid dune slacks** since the CMP appears to indicate that the rate of loss has increased. The estimation of loss during the CMP was difficult because there were no maps or data with which to compare the CMP results, so the rate of loss may have been underestimated at that time. The rate of anthropogenic

loss may also have been underestimated during the SDM because of incomplete data regarding the hydrological status of some sites. During the SDM, many dune slacks were mapped for the first time, although the plant communities present in them indicated that they had been present on the sites for a considerable length of time and were probably overlooked during mapping for the CMP. As a result, the area of **2190 Humid dune slacks** was revised upwards by 32% in comparison with the CMP maps. This means that some loss of the habitat may have gone undetected during the SDM. Because of the continued habitat loss equal to less than 1% per year since the CMP survey was carried out, Area was assessed as Unfavourable-Inadequate during the SDM and the trend was deteriorating.

Structure and Functions were assessed as Unfavourable-Inadequate during the CMP. At that time, 5% of the monitoring stops failed the assessment, but 9% of the habitat was considered to have Unfavourable Structure and Functions as some sites were assessed on the basis of expert judgement alone. The attributes which failed most frequently assessed the proportion of broadleaved herbs to grasses, cover of *Salix repens*, typical species and negative indicator species. These criteria also failed frequently during the SDM with the exception of cover of *Salix repens*, which did not fail at any site. If it had been assessed on a stop basis, this would have failed at some locations. The other criteria that failed frequently during the SDM assessed the cover of bare ground and damage due to disturbance. In contrast to the SDM methodology, the absence of bare soil did not result in a fail during the CMP and damage due to disturbance was not assessed. There was very little change in the Structure and Functions assessment since the CMP. Structure and Functions were assessed as Unfavourable-Inadequate and the trend was stable.

The threats facing **2190 Humid dune slacks** have changed very little since the baseline survey. The impacts recorded most frequently both during the CMP and the SDM related to agriculture. Water abstraction for a variety of uses was an important negative impact, but this is very difficult to quantify and is believed to have been underestimated during the SDM. Although groundwater abstraction was stated to be the most serious threat to the habitat during the CMP (Ryle *et al*. 2009), it was not noted in the list of impacts and activities affecting the habitat in the CMP report. Hydrology is one of the main drivers of dune slack ecology, and lack of information on water abstraction means that it is very difficult to determine what the condition of the habitat will be in 12 years' time. Continued habitat loss is anticipated, and Structure and Functions are likely to be maintained in Unfavourable condition. Future Prospects were assessed as Unfavourable-Inadequate and the trend was deteriorating.

Table 3.75 shows the Conservation assessment for **2190 Humid dune slacks**. All of the parameters were assessed as Unfavourable-Inadequate. Two parameters, Area and Future Prospects, continue

to decline. The conservation status of **2190 Humid dune slacks** was assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Table 3.75: Results of the conservation assessment of 2190 Humid dune slacks.

Parameter	**CMP assessment**	**SDM assessment**	**Trend**
Area	Unfavourable-Inadequate	Unfavourable-Inadequate	Deteriorating
Structure and Functions	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable
Future Prospects	Unfavourable-Inadequate	Unfavourable-Inadequate	Deteriorating
Conservation assessment	Unfavourable-Inadequate	Unfavourable-Inadequate	Deteriorating

3.10 *21A0 Machair

3.10.1 Area and distribution

***21A0 Machairs** habitat was recorded at 12 of the 39 sites visited during the SDM. It has a distinct north-western distribution, in keeping with the definition of the habitat (Figure 3.10). Where it occurs, it can cover a very large area, for example at site 128 Garter Hill, where the habitat covers an area of 234.62 ha (Table 3.76).

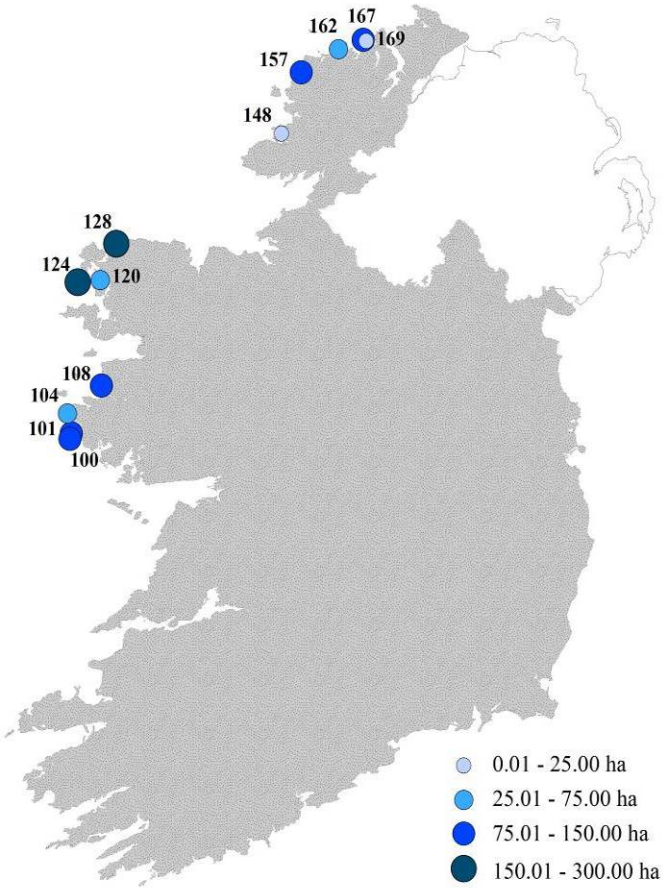

Figure 3.10: Distribution of SDM sites supporting *21A0 Machairs with the area of the habitat indicated.

Table 3.76: Area of *21A0 Machair (surveyed and Unsurveyed) on the revised CMP maps and the SDM maps.

Site no.	Site name	Revised CMP area(ha)	SDM area (ha)
100	Aillebrack	90.11	90.40
101	Doonloughan	113.62	113.27
104	Omey Island	45.63	45.80
108	Dooaghtry	142.64	143.74
120	Doo Lough	63.40	63.19
124	Aghleam	152.17	155.00
128	Garter Hill	205.59	234.62
148	Sheskinmore	24.25	21.28
157	Derrybeg	96.64	124.40
162	Rinclevan	41.35	41.42
167	Tranarossan	79.81	97.90
169	Lough Nagreany	8.54	8.54

The area of ***21A0 Machairs** mapped during the baseline survey, the revised CMP area and the area mapped during the SDM are shown in Table 3.77. Because of some changes to the boundaries of ***21A0 Machairs** mapped during the baseline survey, the area of the habitat represented on the revised CMP maps is 131.60 ha greater than that on the original CMP maps. Unsurveyed parts of the habitat were not included in the calculations of change in area, and these amounted to 83.66 hectares. The main reasons for areas to have been mapped but not surveyed were because they were outside of the boundaries marked on the original baseline maps, had undergone considerable alteration through agriculture or tourist activities (caravan parks) or because of access difficulties. The remaining areas which were included in the change in area assessment are shown in Table 3.77.

Table 3.77: Area of *21A0 Machairs within the sample sites as represented on different maps.

	Total mapped area (ha)	**Area used in calculation of change (ha)**
CMP area	932.14	n/a
Revised CMP area	1063.74	980.08
SDM area	1139.56	1055.90

Area was assessed as Unfavourable-Inadequate during the CMP. There has been a genuine increase in ***21A0 Machairs** since the baseline survey. This is primarily due to the partial recovery of 28.06 ha which were formerly extremely eroded at site 128 Garter Hill. Although this can be considered to be a natural recovery, there are signs this was aided by a reduction in grazing intensity, and so this recovery was considered to be the result of improved management. Anthropogenic loss also occurred. The total loss in area which can be ascribed to human activity is 7.24 ha (0.7% of the area in the Revised CMP) (Table 3.78). The loss is due to erosion which has been exacerbated by human activity at site 108 Doonloughan and to the conversion of an area of ***21A0 Machairs** at site 157 Derrybeg to a sports pitch. The loss in area is equal to less than 1% per year since the CMP was carried out. Because habitat loss has continued, Area was assessed as Unfavourable-Inadequate.

Table 3.78: Change in area of *21A0 Machairs since the baseline survey.

	Area (ha)	Area (%)
Increase due to natural and anthropogenic factors	83.06	8.5
Loss due to anthropogenic factors	7.24	0.7
Net change in area (increase)	75.82	7.7

3.10.2 Structure and Functions

Table 3.79 shows the percentage of sites at which each criterion failed in the Structure and Functions assessment. The criterion which failed most frequently assessed sward height, which failed at 50% of sites, followed by criteria assessing negative indicator species, damage due to disturbance and bryophyte cover.

Table 3.79: The percentage of sites at which each criterion failed in the Structure and Functions assessment for *21A0 Machairs.

Criterion	Failed (% of sites)
Target species	8.3
Rare species	0.0
Bryophyte cover	16.7
Negative indicator species	33.3
Non-native species	0.0
Flowering/fruiting	0.0
Bare ground	8.3
Sward height	50
Alterations to sediment dynamics	0.0
Damage due to disturbance	33.3

The Structure and Functions assessments of ***21A0 Machairs** at each of the 12 sites where it was recorded during the SDM are shown in Table 3.80. One site, site 148 Sheskinmore, was assessed as Favourable, and the remainder were assessed as Unfavourable-Inadequate.

Table 3.80: The results of the Structure and Functions assessment for *21A0 Machairs showing which of the criteria passed and failed. Favourable, Unfavourable-Inadequate and Unfavourable-Bad are abbreviated to F, U-I and U-B respectively.

Site no.	Positive indicator species	Rare species	Bryophyte cover	Negative indicator species	Non-native species	Flowering/ fruiting	Bare ground	Sward height	Alterations to sediment dynamics	Damage due to disturbance	Assessment
100	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Fail	U-I
101	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Fail	U-I
104	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Fail	U-I
108	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Fail	Pass	Pass	U-I
120	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	U-I
124	Fail	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	U-I
128	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Fail	Pass	Pass	U-I
148	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	F
157	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Fail	U-I
162	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail	Pass	Pass	U-I
167	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	U-I
169	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass	Pass	Pass	U-I

In total, 999.27 ha were included in the Structure and Functions assessment. All of the parts of the habitat that were labelled as unsurveyed or external were excluded. The combined area of ***21A0 Machairs** within the sample sites that was assessed as Favourable or Unfavourable is presented in Table 3.81. Most (66.8%) of the habitat was in Unfavourable condition, so the Structure and Functions are assessed as Unfavourable-Bad. This is comparable to the CMP assessment. Structure and Functions of ***21A0 Machairs** were assessed as Unfavourable-Bad during the SDM.

Table 3.81: The total assessed area and percentage of area of *21A0 Machairs in Favourable and Unfavourable condition in 2011/2012.

	Area (ha)	Area (%)
Favourable	332.04	33.2
Unfavourable	667.23	66.8

3.10.3 Impacts and activities

Positive impacts were noted at eight sites, neutral impacts were noted from 12 sites and negative impacts were noted from 12 sites. The median impact score across all sites irrespective of area was -6 and the most negative score of any site was -9.

Four positive impacts were recorded in ***21A0 Machairs**, three of which related to agricultural management and one to shooting of rabbits where they damaged the habitat (Table 3.82).

Table 3.82: Positive impacts affecting *21A0 Machairs, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
A04.02.01	Non-intensive cattle grazing	8.3	41.7	0.0	50.0	340.87	29.9
F03.01	Hunting	8.3	0.0	0.0	8.3	45.80	4.0
A04.02.02	Non-intensive sheep grazing	8.3	0.0	0.0	8.3	39.16	3.4
A04.02.03	Non-intensive horse grazing	8.3	25.0	0.0	33.3	8.76	0.8

Three of the most extensive neutral impacts related to grazing. Intensive sheep grazing was noted as neutral where the benefits of management outweighed the effects of improvement (Table 3.83). Walking had a neutral impact on 9.6% of the habitat. Saltwater intrusion was a natural occurrence at two sites.

Table 3.83: Five neutral impacts affecting the greatest area of *21A0 Machairs, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
A04.02.02	Non-intensive sheep grazing	0.0	8.3	0.0	8.3	136.55	12.0
A04.02.01	Non-intensive cattle grazing	16.7	0.0	0.0	16.7	116.14	10.2
G01.02	Walking, horse riding and non-motorised vehicles	58.3	8.3	0.0	66.7	109.42	9.6
A04.01.02	Intensive sheep grazing	0.0	8.3	8.3	16.7	13.01	1.1
J02.09.01	Saltwater intrusion	0.0	8.3	0.0	8.3	9.79	0.9

The negative impact affecting the greatest area was non-intensive sheep grazing (Table 3.84). Damage by herbivores was recorded where rabbit grazing and burrowing were problematic. Because of the exposed nature of ***21A0 Machairs**, they tend to be susceptible to erosion once grazing and burrowing have become excessive, and this was particularly apparent at sites 128 Garter Hill and 108 Dooaghtry. ***21A0 Machairs** habitat is also susceptible to agricultural intensification through fertilization. Off road driving was recorded at 12 sites.

Table 3.84: Five negative impacts affecting the greatest area of *21A0 Machairs, the percentage of sites (where the habitat occurs) which were affected, the degree of impact and the area of the habitat affected.

Impact code	Impact description	Percentage of sites affected:				Area affected (ha)	Area affected (% of total sample area)
		Low intensity	Medium intensity	High intensity	Total		
A04.02.02	Non-intensive sheep grazing	8.3	25.0	0.0	33.3	425.23	37.3
K04.05	Damage by herbivores (including game species)	8.3	16.7	0.0	25.0	175.36	15.4
K01.01	Erosion	0.0	16.7	8.3	25.0	83.24	7.3
A08	Fertilisation	8.3	8.3	0.0	16.7	52.72	4.6
G01.03.02	Off-road motorised driving	16.7	41.7	41.7	100.0	42.20	3.7

Future Prospects were assessed as Unfavourable-Bad during the CMP. With no improvement in the conservation status of the habitat foreseen, Future Prospects were assessed as Unfavourable-Bad during the SDM.

3.10.4 Conservation assessment

Table 3.85 shows the conservation assessment for ***21A0 Machairs.** Area was assessed as Unfavourable-Inadequate during the CMP as agricultural improvement and land enclosure were believed to have resulted in loss of 2.35% of the habitat over the preceding ten years. Although some recovery was noted during the SDM, habitat loss due to human activities amounting to 0.7% was noted to have occurred since the CMP, and Area was again assessed as Unfavourable-Inadequate. Because both losses and recovery were noted to have occurred, the trend was stable.

During the CMP, 49% of the habitat was considered to be in Unfavourable condition and Structure and Functions were assessed as Unfavourable-Bad. The criteria which failed most frequently were negative indicator species and sward height, but failures were recorded for all of the criteria. Sward height and negative indicator species were also the criteria that failed most frequently during the SDM, but the area in Unfavourable condition was greater (66.8%). The difference in the area in Unfavourable condition may be related to changes in the methodology because if one of the six criteria assessed at a stop failed during the CMP, the stop was still allowed to pass. Structure and Functions

were assessed as Unfavourable-Bad during the SDM. As there was no evidence of either a marked improvement or deterioration in the condition of the habitat, the trend was stable.

During the CMP, the most frequent impacts were related to agriculture and recreation, with grazing, overgrazing and field enclosure the three impacts affecting the greatest area. The pressures affecting ***21A0 Machairs** do not appear to have altered significantly between the CMP and the SDM. Although there has been some recovery in ***21A0 Machairs**, and this allowed a previously eroded area to be included in the habitat assessment (site 128 Garter Hill), the impacts affecting ***21A0 Machairs** have become more severe at other sites (e.g. erosion at site 108 Dooaghtry). The negative effects of agriculture and herbivores are expected to continue to have an impact of the conservation status of the habitat for the foreseeable future. Future Prospects were assessed as Unfavourable-Bad during the SDM, and trend was stable.

There has been no change in any of the parameters of the conservation assessment since the baseline survey and ***21A0 Machairs** habitat was assessed as Unfavourable-Bad (stable) during the SDM.

Table 3.85: Results of the conservation assessment of *21A0 Machairs.

Parameter	CMP assessment	SDM assessment	Trend
Area	Unfavourable-Inadequate	Unfavourable-Inadequate	Stable
Structure and Functions	Unfavourable-Bad	Unfavourable-Bad	Stable
Future Prospects	Unfavourable-Bad	Unfavourable-Bad	Stable
Conservation assessment	Unfavourable-Bad	Unfavourable-Bad	Stable

4. Discussion

4.1 Complexity of sand dune systems

Sand dune systems incorporate a range of habitats from highly dynamic, seaward communities to the more mature, landward communities where grassland, heath, scrub and woodland can become established. Although dunes include some of the most natural, pristine habitats in Ireland, they also comprise communities that are dependent on management by humans for their maintenance, in addition to habitats that are highly vulnerable to human interference. Dune systems are also vulnerable to offshore developments as well as terrestrial land management. Works that alter the processes of coastal erosion, deposition and sediment transport are particularly unpredictable and far-reaching.

Much of the ecological value of sand dunes lies in the variety of micro-habitats that they contain. The small-scale habitat variation of sand dune systems is of benefit to invertebrate fauna, providing bare sand, exposed and sheltered aspects and dry and damp habitats (Howe *et al*., 2009). Sand dunes are also an important resource on a greater landscape scale. For example, Chough breed and roost on sea cliffs but were observed to forage in sand dunes at several sites during the SDM. In the context of agricultural intensification and land-use change, protected sand dune habitats are an important resource for wildlife.

Sand dune habitats depend on a range of external inputs that must be maintained for the ecosystem to function. Input of organic material from high tides and windblown sand are particularly important for fore-dune habitats, while groundwater is vital for maintenance of **2190 Humid dune slacks** and ***21A0 Machairs**. Reducing the availability of these resources in the wider landscape will reduce the rate of habitat formation and, over time, will result in loss of area. The individual habitats within sand dunes are mutually dependent, as fore-dunes succeed over time to fixed dunes, and the material in fixed dunes can become mobilised during storms to form fore-dunes again. Permanent damage to one habitat can therefore have long-term effects on the system as a whole. The transitional areas where sand dunes grade into wetlands, saltmarshes and beaches are important because they provide some of the resources such as groundwater and fresh sand required for the sand dune system to function. Draining the wetlands that typically occur behind dune systems or erecting sea walls interferes with the natural processes upon which sand dune ecosystems depend. Interrupting the natural transitions between sand dunes and other habitats also reduces the ecological value of sand dunes as fauna from the wider landscape is no longer able to access the dunes. The environmental conditions in transitional areas are often unusual, and some of the rarer species recorded during the SDM were located in transitional areas. For example, *Parentucellia viscosa* was found where a dune slack graded

into saltmarsh at Banna Strand in Kerry, and *Phallus hadriani (*dune stink horn) was found in a extremely unstable boundary between ***2130 Fixed dunes (grey dunes)**, accreting sand and organic matter at the northern tip of the sand island at site 68 Rossbehy.

The assessment of individual Annex I habitats should be considered in the context of the wider landscape, taking interactions with other habitats into account.

None of the Annex I habitats that were assessed during the SDM are in Favourable conservation status. Given that the habitats included on Annex I of the Habitats Directive were specifically chosen because they were threatened or rare (Commission of the European Communities, 2006), it may not be surprising that they have yet to reach Favourable status six years after the publication of the baseline data. Factors affecting the conservation status of Annex I sand dune habitats are discussed below.

4.2 Main reasons for habitats to fail the conservation assessments

4.2.1 Interference with sediment dynamics

Coastal defences, sediment extraction, beach cleaning and coastal developments such as piers are included in this category; they all cause the removal of sediment or changes to the patterns of erosion and deposition in sand dune systems.

The aim of sea defences is to reduce erosion at locations perceived to be vulnerable. However, by preventing the erosion, they reduce the amount of sediment in the system, so that beaches nearby suffer from a lack of sand deposition. Structures perpendicular to the shore can interfere with sediment dispersal by longshore drift so that deposition occurs up-drift and erosion occurs down-drift. Structures, such as breakwaters, which are positioned parallel to the shore have more extreme effects on sediment dynamics and can cause narrowing of beaches and a reduction in organic matter (McLachlan and Brown, 2006). Figure 4.1 shows a recently constructed sea wall and rock armour at site 133 Strandhill, Co. Sligo.

Figure 4.1: Sea wall and rock armour at site 133 Strandhill, Co. Sligo.

The reduction in available sand can have a direct impact on frontal dune habitats. **1210 Vegetation of drift line communities** and **2110 Embryonic shifting dunes** rely on the input of fresh sediment and organic material to persist. If human interference causes the supply of coastal material to diminish, the habitats will deteriorate and eventually disappear from the system because of other processes such as succession or erosion.

There are knock-on effects on other habitats. **1210 Vegetation of drift line communities** and **2110 Embryonic shifting dunes** represent the first steps in dune building, so the expansion of the dune system is inhibited both because of the reduction in the availability of fresh sand and because of the lack of sand-trapping vegetation. Sand dune habitats are constantly maturing and drying out, so the persistence of **2190 Humid dune slacks** and **2170 Dunes with creeping willow** in particular is dependent on the growth of existing dune systems and the development of new ones.

A precautionary approach has been followed for this project, which assumes that attempts to alter the natural erosion and deposition cycles on our coasts impair the functioning of the whole system through a variety of effects including over-stabilisation.

4.2.2 Agriculture

Sand dune habitats, particularly ***2130 Fixed dunes (grey dunes), *21A0 Machairs**, **2170 Dunes with creeping willow** and **2190 Humid dune slacks**, are an important agricultural resource as they provide pasture for cattle, sheep and horses. This management helps to maintain a balance of broadleaved herbs, grasses and scrub species, and agricultural grazing was frequently noted as a positive impact on sand dune habitats during the SDM. Lack of management can result in bracken encroachment and succession to scrub communities. Figure 4.2 shows how different grazing intensities have affected the vegetation structure in ***2130 Fixed dunes (grey dunes)** at site 124 Aghleam, Co. Mayo.

Figure 4.2: Different management regimes at Aghleam, Co Mayo, have resulted in a uniform sward in one field and a more tussocky structure on the other side of the fence.

Agriculture can also have a negative effect on dune systems. ***21A0 Machairs** and ***2130 Fixed dunes (grey dunes)** are vulnerable to reseeding, overgrazing and application of fertilisers, all of which reduce the plant diversity of sand dune communities. **2190 Humid dune slacks** appear to be particularly attractive to grazers, and the sward can be grazed very closely. They are frequently chosen as locations for stock feeding, and ponds are sometimes excavated in dune slacks for watering livestock. These impacts can lead to localised disturbance of the substrate and the establishment of ruderal communities. Any interference with the hydrological processes of dune slacks is considered to be damaging.

4.2.3 Succession

In the context of ***2130 Fixed dunes (grey dunes)** and **2190 Humid dune slacks**, the presence of frequent trees and scrub is generally considered to be a negative impact. However, the succession from dune grasslands to scrub and woodland is a natural process and, in places where pasture has been abandoned, some of the dune habitats have started the transition to scrub and woodland. Small areas of naturally occurring scrub and woodland can be seen at site 18 Mizen Head, where *Betula pubescens* and *Salix* spp. have become established (Figure 4.3). Dune woodland is recognised as a habitat of conservation interest under the Habitats Directive (Commission Of the European Communities, 2007), but the habitat has not been recognised as occurring in Ireland. **2180 Wooded dunes of the Atlantic, Continental and Boreal region** can include natural woodland or long-established semi-natural forests. Where dune woodland has developed spontaneously in Ireland, it could be proposed for consideration under this category. The presence of scrub and trees is likely to enhance the dunes as a resource for bird species (Fuller *et al.*, 2004). Given the practical difficulties of keeping livestock on sites with intensive amenity use, allowing succession from herbaceous communities to woodland may be a viable alternative for selected locations on some sites. The development of dune woodland at any site should be carefully planned and managed.

Figure 4.3: Scrub and woodland have developed due to past undergrazing at site 18 Mizen Head, Co. Wicklow.

4.2.4 Rabbit activity

In the past, sand dune sites were frequently used to raise rabbits as a food source, and evidence of this can be seen in place names such as Ballyteige Burrow and on early twentieth century Ordnance Survey maps. Although initially well-managed, rabbits escaped and have become naturalised on sand dunes around the country. Prior to declines in population due to myxomatosis (and, more recently, rabbit haemorrhagic disease), rabbits were a main driver of the characteristic herbaceous sand dune vegetation communities in Britain and Ireland (Ranwell, 1972).

Figure 4.4: Damage due to overgrazing and burrowing by rabbits at site 64 Barley Cove, Co. Cork.

The degree of influence exerted by rabbits on sand dune systems today is highly variable. They can have a positive influence in situations where other grazing animals are absent and rabbit numbers are not excessive. However, rabbit burrowing and grazing can cause extensive damage to the structure of sand dunes if populations are uncontrolled. Rabbit damage can be seen at sites 104 Omey Island, and 64 Barley Cove (Figure 4.4).

4.2.5 Forestry

Mature conifer plantations are a feature of some sand dune habitats. The presence of a closed canopy makes the habitat unsuitable for the typical herbaceous communities of fixed dunes, and the presence of trees causes the water table of dune slacks to be lowered, accelerating drying out of **2190 Humid dune slacks**. However, the relationship between conifer plantations and sand dunes is complex. The drying affect that conifers have on sand dune systems may actually promote the conditions required for the establishment of **2170 Dunes with creeping willow** (JNCC, 2007). The rare plant *Pyrola rotundifolia* ssp. *maritima* was found at two sites in the SDM: site 133 Strandhill and site 35 The Raven (Figure 4.5). In both cases, it occurred in **2170 Dunes with creeping willow** that were associated with conifer plantations dating back to the first half of the twentieth century. Dune woodland is a very unusual habitat in Ireland and such plantations may provide some of the functions of native woodland at these sites.

Figure 4.5: *Pyrola rotundifolia* growing in 2170 Dunes with creeping willow next to a conifer plantation at site 35 The Raven, Co. Wexford.

4.2.6 Disturbance due to human activity

Sand dunes and beaches are well-utilised amenity resources in Ireland, particularly at sites on the east coast or close to settlements. Sites such as site 3 Mornington and 11 South Bull Island are traversed by a network of paths which can be seen easily on aerial photographs. Blowouts, where exposed sand is subjected to erosion, are maintained and enlarged by trampling and recreational activities such as dune surfing at sites 75 Castlegregory and 46 Tramore. The exposure of the unconsolidated substrate impairs the structural integrity of sand dune habitats and exposes them to erosion, and in extreme cases considerable habitat loss can occur. The use of motorised vehicles, particularly for recreational use but also to transport livestock, can cause considerable damage, even if the impact occurs infrequently, and recovery from such damage can take years (McLachlan and Brown, 2006). This can be seen at site 108 Doonloughan, where historic disturbance of the substrate due to burial of rubbish and overgrazing has resulted in several hectares of ***2130 Fixed dunes (grey dunes)** and ***21A0 Machairs** being reduced to bare sand. Although the damage can be extensive, it is not necessarily irreversible (Maun, 2009). The partial recovery of ***21A0 Machairs** at site 128 Garter Hill since the baseline survey illustrates the ability of sand dune habitats to regenerate if they are managed appropriately.

4.2.7 Climate change and coastal processes

Although not fully understood as yet, climate change can be expected to have a profound effect on coastal systems. Sea level is predicted to rise by up to 90 cm worldwide by the year 2100 and extreme weather events are expected to increase in frequency (McLachlan and Brown, 2006). Increased mobility of dune systems can be expected in the long term, as can some loss of habitat. However, sand dune systems are capable of persisting in the face of environmental changes. A study of sand dune systems subject to sea level rise in Wales concluded that 14 of the 15 systems investigated had continued to grow over the previous 100-120 years despite sea level rise (Saye and Pye, 2007). Sand dune systems absorb considerable destructive wave energy and are important defences against storm activity (Maun, 2009). Beaches that have been starved of sediment due to man-made constructions will be at greater risk of erosion than those with a plentiful sand supply (McLachlan and Brown, 2006). Where development has extended close to the coast, it can be expected that the range of sand dune habitats will be reduced. The most extensive sand dune systems in Ireland tend to be distributed on the west coast, where there is more potential for landward retreat of coastal habitats. Such landward retreat of sand dune sediments has been seen at the Doñana National Park in Spain (Maun, 2009). However, sand dune systems on the west coast are exposed to violent storm activity from the Atlantic, and the massive erosion at site 68 Rossbehy shows the potential magnitude of the effects of such storms (Figure 4.6).

Figure 4.6: Storm erosion at site 68 Rossbehy, Co. Kerry. Prior to 2010, the sand and shingle in the foreground was part of a long, vegetated sand spit which was attached to the dunes visible in the distance.

4.2.8 Invasive species

At sites surveyed during the SDM, the more stable, landward sand dune habitats are most prone to invasion by exotic species. Non-native species may enter a habitat either accidentally (e.g. as garden waste) or deliberately by planting. During the SDM, there was evidence that an attempt had been made to introduce species into the dunes at site 124 Aghleam, where exotic species had been deliberately planted in the fixed and mobile dunes, but there were no signs that the introduction was becoming established there. Invasion of dune habitats by conifer species is a hazard where parts of the dune system have been afforested, as at sites 133 Strandhill and 35 The Raven.

Figure 4.7: *Hippophae rhamnoides* in *2130 Fixed dunes (grey dunes) at site 75 Castlegregory, Co. Kerry.

2160 Dunes with *Hippophae rhamnoides* is an Annex I habitat elsewhere in Europe (Commission of the European Communities, 2007), but *Hippophae rhamnoides* is not native to Ireland and forms dense, monospecific stands on sand dunes. These dense stands crowd out native vegetation and help to lower the water table. *Hippophae rhamnoides* has been planted deliberately, most frequently as a measure against erosion. Attempts to remove it must be planned carefully to avoid exposing bare soil to erosive winds. Large scrub thickets were noted at sites 9 Portmarnock, 10 North Bull Island, 11 South Bull Island, 17 Brittas Bay, 28 Cahore Point North, 75 Castlegregory, 155 Kincaslough and 162 Rinclevan during the SDM. Site 75 Castlegregory was particularly badly affected, and the area affected was visibly greater than it had been during the CMP (Figure 4.7). Efforts to control the shrub were visible at sites 10 North Bull Island, 155 Kincaslough and 162 Rinclevan.

4.3 Constraints of the methodology

The changes made in the SDM to the methodology for assessing sand dune systems have reduced the need for expert judgement and allowed for structural diversity in sand dunes. Some difficulties remain, and these tend to be associated with the imposition of a rigid monitoring system on a dynamic habitat. Dividing the sand dune systems into individual habitats allows the main characteristics of successional stages to be described and assessed separately, but it does not account for complex habitat mosaics or for gradual gradations between habitats. Criteria assessing flowering and fruiting of plants and height of vegetation are subject to assessment at particular times of year, and it is recommended that these criteria be altered in future so that they are more robust.

There were particular constraints affecting **1220 Perennial vegetation of stony banks**, ***2140 Decalcified *Empetrum* dunes**, ***2150 Decalcified dune heath** and ***21A0 Machairs**.

4.3.1 1220 Perennial vegetation of stony banks

The definition of this habitat includes communities of large, stable shingle banks of upper beaches such as those found in southern Wexford, as well as the more exposed beach-fringing communities that were surveyed during the SDM. Beach-fringing communities tend to be less species rich than communities of more stable shingle banks, and this was taken into account as far as possible in the assessment methodology. However, the processes and impacts affecting larger, more stable shingle banks are different from those which were included in the SDM. These differences should be taken into account in the National Conservation Assessment for reporting to the European Commission.

*4.3.2 *2140 Decalcified* Empetrum *dunes and *2150 Decalcified dune heath*

Although the area of dune heath present at SDM sites and the impacts affecting dune heath were recorded, a full conservation assessment could not be carried out as Structure and Functions data were not recorded. These habitats are very unusual in Ireland, and parts of the habitats which had been recorded previously in Ireland were found to consist of heath species growing on shallow, calcareous sand overlying acidic rock. The herbaceous species in the vicinity suggested that the sand retained calcareous material and the presence of heath species was related to the acidic rock rather than decalcification of the sand. This type does not conform to the EU interpretation manual definition of the habitat (Commission of the European Communities, 2007). They were mapped as heath, and although they do not conform to dune heath, they can be included in the Annex I dry heath habitat **4030 European dry heaths**.

*4.3.3 *21A0 Machairs*

***21A0 Machairs** are difficult habitats to define and they share characteristics with ***2130 Fixed dunes (grey dunes)** and **2190 Humid dune slacks**. In some cases, it has been difficult to detect differences between areas mapped as ***21A0 Machairs** in the CMP and the adjacent ***2130 Fixed dunes (grey dunes), 2190 Humid dune slacks** or fen habitats. As a result, there was considerable change to the boundaries of ***21A0 Machairs** as mapped in the CMP. At site 155, Kincaslough, the area previously mapped as ***21A0 Machairs** was entirely remapped as ***2130 Fixed dunes (grey dunes)** because the vegetation and structure of the habitat were very similar to that of the surrounding fixed dunes.

4.4 Other Annex I habitats which may occur in Ireland

In addition to the ten sand dune habitats documented in this report, a further two Annex I habitats may occur: **2180 Wooded dunes of the Atlantic, Continental and Boreal region** and ***2250 Coastal dunes with *Juniperus* spp.** Native woodland was noted within or adjacent to fixed sand dunes at sites 18 Mizen Head and 175 Crummies Bay. *Juniperus communis* formations occurring on **2120 Marram dunes (white dunes)**, ***2130 Fixed dunes (grey dunes)** and ***21A0 Machairs** have been included under **5130 *Juniperus communis* formations on heaths or calcareous grasslands** (Cooper *et al*., 2012), but it is possible that these could be better placed in the ***2250 Coastal dunes with *Juniperus* spp.** Recognising these two habitats in Ireland would promote the management of woodlands and juniper scrub in the context of sand dunes, taking into account the unique pressures and processes affecting coastal habitats.

References

Boorman, L., Londo, G. and van der Maarel, E. (1997) Communities of dune slacks. In: *Dry Coastal Ecosystems, part C. Ecosystems of the World* (E. Van der Maarel, Ed.), 275-295. Elsevier, Amsterdam.

Commission of the European Communities (2006) Notes and guidelines - Reporting under Article 17 of the Habitats Directive, Appendix 1 - Annexes of DocHab 04-03/03-Rev.3.

Commission of the European Communities (2007) *Interpretation manual of European Union habitats – EUR27.* http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/2007_07_im.pdf.

Cooper, F., Stone, R.E., McEvoy, P., Wilkins, T. and Reid, N. (2012) The conservation status of juniper formations in Ireland. *Irish Wildlife Manuals*, No. 63 National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Crawford, I., Bleasdale, A. and Conaghan, J. (1996) BioMar survey of Irish machair sites. *Irish Wildlife Manuals*, No. 3. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin, Ireland.

Curtis, T. (1991) The flora and vegetation of sand dunes in Ireland. In: *A guide to the sand dunes of Ireland*, (M.B. Quigley, Ed.), 42-66. European Union for Coastal Conservation, Dublin.

Dargie, T. (1993) *Sand dune vegetation survey of Great Britain: a national inventory. Part 2: Scotland.* Joint Nature Conservation Council, Peterborough.

Dargie, T. (1995) *Sand dune vegetation survey of Great Britain: a national inventory. Part 3: Wales.* Joint Nature Conservation Council, Peterborough.

Devaney, F. (2007) *The Alder Marsh: Ecohydrology and restoration prospects of a desiccating dune slack.* Ph.D. Thesis, University College Dublin.

Ellmauer, T. (2010) Future prospects: Draft discussion paper for the expert group on reporting under the Nature Directives. http://circa.europa.eu/Public/irc/env/monnat/library?l=/expert_ reporting/workpackage_revision/sub-group_papers/future_prospects/prospects_june 2010pdf/ _EN_1.0_&a=d. Accessed in 2010.

Evans, D. and Arvela, M. (2011) *Assessment and reporting under the Habitats Directive.* European Topic Centre on Biological Diversity. Paris, France. http://circa.europa. eu/Public/irc/env/monnat/library ?l=/habitats_reporting/reporting_2007-2012/reporting_ guidelines/guidelines-finalpdf/_EN_1.0_& a=d.

Fossitt, J. (2000) *A guide to habitats in Ireland.* The Heritage Council, Kilkenny.

Fuller, R. J., Hinsley, S. A. and Swetnam, R. D. (2004) The relevance of non-farmland habitats, uncropped areas and habitat diversity to the conservation of farmland birds. *Ibis*, 146: 22–31. doi: 10.1111/j.1474-919X.2004.00357.x.

Gaynor, K. (2006) The vegetation of Irish machair. *Biology and Environment: Proceedings of the Royal Irish Academy*, **106B (3)**: 311-321.

Gaynor, K. (2008) *The phytosociology and conservation value of Irish sand dunes.* Ph.D. Thesis, University College Dublin.

Heslenfeld, P., Jungerius, P. D. and Klijn, J. A. (2008) European Coastal Dunes: Ecological Values, Threats, Opportunities and Policy Development. Ecological Studies Volume 171, 2008, pp 335-351.

Howe, M.A., Knight, G. T. and Clee, C. (2009) The importance of coastal dunes for terrestrial invertebrates with particular reference to aculeate Hymenoptera (bees, wasps & ants), *Journal of Coastal Conservation*, June 2010, **14**(2) pp 91-102.

JNCC (2004a) *Common standards monitoring guidance for sand dune habitats*. Joint Nature Conservation Council, Peterborough.

JNCC (2004b) *Common standards monitoring guidance for lowland heathland.* Joint Nature Conservation Council, Peterborough.

JNCC (2007) Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: www.jncc.gov.uk/article17.

Maun, A. (2009) *The biology of coastal sand dunes*, Oxford University Press, Oxford, UK.

McLachlan, A. and Brown, A.C. (2006) *The ecology of sandy shores*, 2nd ed. Elsevier, London, UK.

Moore, D. and Wilson, F. (1999) *National shingle beach survey of Ireland 1999: Synoptic report*. A report submitted to the National Parks and Wildlife Service, Dublin.

NPWS (2008) *The status of EU protected habitats and species in Ireland.* A report by the National Parks and Wildlife Service, Dublin.

O'Neill, F.H., Martin, J.R, Devaney, F.M., McNutt, K.E., Perrin, P.M. and Delaney, A. (2010) *Irish semi-natural grasslands survey Annual Report No. 3: Counties Donegal, Dublin, Kildare and Sligo.* Unpublished report submitted to National Parks and Wildlife Service, Dublin.

Quigley, M.B. (1991) Introduction. In: *A guide to the sand dunes of Ireland,* (M.B. Quigley, Ed.), 1-5. European Union for Coastal Conservation, Dublin.

Radley, G. (1994) *Sand dune vegetation survey of Great Britain: Part 1: England.* Joint Nature Conservation Council, Peterborough.

Ranwell, D.S. (1972) *Ecology of saltmarshes and sand dunes*, Chapman and Hall, London.

Ryle, T., Murray, A., Connolly, K. and Swann, M. (2009) *Coastal Monitoring Project 2004-2006.* A report submitted to the National Parks and Wildlife Service, Dublin.

Saye, S.E. and Pye, K. (2007) Implications of sea level rise for coastal dune habitat conservation in Wales, UK. *Journal of Coastal Conservation*, **11**, 31-52.

Ssymank, A. (2010) Reference list threats, pressures and activities (final version). http://circa.europa.eu/Public/irc/env/monnat/library?l=/expert_reporting/work-package_ revision/sub-group_papers/pressures_-threats(vm=detailed&sb=Title. Accessed March 2011.

Appendix I: Structure and functions assessment sheets for eight EU Annex I sand dune habitats

The eight Annex I sand dune habitats are presented in the order:

1210 Annual vegetation of drift lines

1220 Perennial vegetation of stony banks

2110 Embryonic shifting dunes

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

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

2170 Dunes with *Salix repens* ssp. a*rgentea* (*Salicion arenariae*)

2190 Humid dune slacks

*21A0 Machairs

* indicates a priority habitat

1210 Annual vegetation of drift lines

Monitoring stop data																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Positive indicator species (√ if present)																
Atriplex spp.																
Beta vulgaris ssp. maritima																
Cakile maritima																
Galium aparine																
Honckenya peploides																
Polygonum oxyspermum																
Salsola kali																
Tripleurospermum maritimum																
2a. Negative indicator species (Domin)																
Arrhenatherum elatius																
Cirsium arvense																
Cirsium vulgare																
Lolium perenne																
Senecio jacobea																
Urtica dioica																
Other:																
2b. Highest Domin score at each stop																
3. Non-native species (Domin)																
Centranthus ruber																
Other:																

General site observations →

Notes:

1. Calculate % of habitat by averaging mid-range values for Domin score as follows:

Domin score	Range	Mid-range value (%)
+	A single individual, <1% cover	0.1
1	2-3 individuals, <1% cover	0.3
2	Several individuals, < 1% cover	0.7
3	1-4% cover	2
4	5-10% cover	7
5	11-25% cover	18
6	26-33% cover	29.5
7	34-50% cover	42
8	51-75% cover	68
9	76-90% cover	83
10	91-100% cover	95.5

2. No failures = Favourable, 1-2 failures = Unfavourable - Inadequate, 3+ failures = Unfavourable - Bad

Habitat assessment at site level				
Habitat assessment criteria	**Habitat assessment scores**		**Required to pass**	**Result (pass/fail)**
1. Positive indicator species	**% frequency**		*At least one species present in more than 40% of stops and another species present in more than 20% of stops*	
Atriplex spp.				
Beta vulgaris				
Cakile maritima				
Galium aparine				
Honckenya peploides				
Polygonum oxyspermum				
Salsola kali				
Tripleurospermum maritimum				
2a. Negative indicator species	**% frequency**	**% of habitat[1]**	*No species present in more than 60% of stops and combined cover of negative indicators 5% or less and highest Domin score 5 or less*	
Arrhenatherum elatius				
Cirsium arvense				
Cirsium vulgare				
Lolium perenne				
Senecio jacobea				
Urtica dioica				
Other:				
2b. Highest Domin score across all stops				
3. Non-native species	**% frequency**		*No species present in more than 20% of stops*	
Centranthus ruber				
Other:				
4. Rare species	**% frequency**		*No declines since last assessment*	
5a. Coastal defences built pre-designation which currently affect the habitat due to modification of these structures or changes to the sediment cycle at the site (presence/absence)			*Both absent*	
5b. Post-designation anthropogenic impacts on the substrate/mobility of the system (e.g. new stabilisation works, sediment extraction) (presence/absence)				
6. Disturbance (e.g. trampling, vehicle damage, removal of substrate) affecting the habitat (% of habitat)			*No more than 20% of habitat*	
			No. of criteria	
			Habitat assessment[2]	

1220 Perennial vegetation of stony banks

Monitoring stop data																		Habitat assessment at the site level				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		Habitat assessment criteria	Habitat assessment scores		Required to pass	Result (pass/fail)
1. Positive indicator species (√ if present)																		**1. Positive indicator species**	**% frequency**		*At least two species present in more than 60% of stops and two other species present in more than 40% of stops* or for beach-fringing communities, *at least two species present in more than 40% of stops and one other species present in more than 20% of stops*	
Beta vulgaris ssp. *maritima*																	→	*Beta vulgaris* ssp. *maritima*				
Crithmum maritimum																	→	*Crithmum maritimum*				
Glaucium flavum																	→	*Glaucium flavum*				
Honckenya peploides																	→	*Honckenya peploides*				
Leymus arenarius																	→	*Leymus arenarius*				
Rumex crispus																	→	*Rumex crispus*				
Silene uniflora																	→	*Silene uniflora*				
Cochlearia officinalis																	→	*Cochlearia officinalis*				
Raphanus raphanistrum																	→	*Raphanus raphanistrum*				
Sonchus arvensis																	→	*Sonchus arvensis*				
Potentilla anserina																	→	*Potentilla anserina*				
2. Negative indicator species (Domin)																		**2a. Negative indicator species**	**% frequency**	**% of habitat[1]**	*No species present in more than 60% of stops* and *combined cover of negative indicators 5% or less* and *highest Domin score 5 or less*	
Cirsium arvense																	→	*Cirsium arvense*				
Cirsium vulgare																	→	*Cirsium vulgare*				
Lolium perenne																	→	*Lolium perenne*				
Senecio jacobea																	→	*Senecio jacobea*				
Urtica dioica																	→	*Urtica dioica*				
Other:																	→	Other:				
2b. Highest Domin score at each stop																	→	**2b. Highest Domin score across all stops**				
3. Non-native species (Domin)																		**3. Non-native species**	**% frequency**		*No species present in more than 20% of stops*	
Centranthus ruber																	→	*Centranthus ruber*				
Other:																	→	Other:				

Notes:

1. Calculate % of habitat by averaging mid-range values for Domin score as follows:

Domin score	Range	Mid-range value (%)
+	A single individual, <1% cover	0.1
1	2-3 individuals, <1% cover	0.3
2	Several individuals, < 1% cover	0.7
3	1-4% cover	2
4	5-10% cover	7
5	11-25% cover	18
6	26-33% cover	29.5
7	34-50% cover	42
8	51-75% cover	68
9	76-90% cover	83
10	91-100% cover	95.5

2. No failures = Favourable, 1-2 failures = Unfavourable - Inadequate, 3+ failures = Unfavourable – Bad

General site observations

→	**4. Rare species**	**% frequency**	*No declines since last assessment*	
→	**5a. Coastal defences built pre-designation which currently affect the habitat due to modification of these structures or changes to the sediment cycle at the site (presence/absence)**		*Both absent*	
→	**5b. Post-designation anthropogenic impacts on the substrate/mobility of the system (e.g. new stabilisation works, sediment extraction) (presence/absence)**			
→	**6. Disturbance (e.g. trampling, vehicle damage, removal of substrate) affecting the habitat (% of habitat)**		*No more than 20% of habitat*	
			No. of criteria failed	
			Habitat assessment[2]	

2110 Embryonic shifting dunes

Monitoring stop data																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Positive indicator species (√ if present)																
Elytrigia juncea																
Leymus arenarius																
2a. Negative indicator species (Domin)																
Arrhenatherum elatius																
Cirsium arvense																
Cirsium vulgare																
Lolium perenne																
Senecio jacobea																
Urtica dioica																
Other:																
Other:																
2b. Highest Domin score at each stop																
3. Non-native species (Domin)																
Name of species:																
Name of species:																
4. Green shoots and flowering in flowering season (√ if present)																

Notes:

1. Calculate % of habitat by averaging mid-range values for Domin score as follows:

Domin score	Range	Mid-range value (%)
+	A single individual, <1% cover	0.1
1	2-3 individuals, <1% cover	0.3
2	Several individuals, < 1% cover	0.7
3	1-4% cover	2
4	5-10% cover	7
5	11-25% cover	18
6	26-33% cover	29.5
7	34-50% cover	42
8	51-75% cover	68
9	76-90% cover	83
10	91-100% cover	95.5

2. No failures = Favourable, 1-2 failures = Unfavourable - Inadequate, 3+ failures = Unfavourable – Bad

General site observations

Habitat assessment for the site				
Habitat assessment criteria	**Habitat assessment scores**		**Required to pass**	**Result (pass/fail)**
1. Positive indicator species	**% frequency**		*At least one species present in more than 40% of stops*	
Elytrigia juncea				
Leymus arenarius				
2a. Negative indicator species	**% frequency**	**% of habitat[1]**	*No species present in more than 60% of stops and combined cover of negative indicators 5% or less and highest Domin score 5 or less*	
Arrhenatherum elatius				
Cirsium arvense				
Cirsium vulgare				
Lolium perenne				
Senecio jacobea				
Urtica dioica				
Other:				
Other:				
2b. Highest Domin score across all stops				
3. Non-native species	**% frequency**		*No species present in more than 20% of stops*	
Name of species:				
Name of species:				
4. Flowering/fruiting of *Elytrigia juncea* or *Leymus arenarius* (% frequency)			*Observed in more than 40% of stops*	
5. Rare species	**% frequency**		*No declines since the last assessment*	
6a. Coastal defences built pre-designation which currently affect the habitat due to modification of these structures or changes to the sediment cycle at the site (presence/absence)			*Both absent*	
6b. Post-designation anthropogenic impacts on the substrate/mobility of the system (e.g. new stabilisation works, sediment extraction) (presence/absence)				
7. Disturbance (e.g. trampling, vehicle damage, removal of substrate) affecting the habitat (% of habitat)			*No more than 20% of habitat*	
			No. of criteria failed	
			Habitat assessment[2]	

2120 Shifting dunes along the shore with *Ammophila arenaria* (white dunes)

Monitoring stop data																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Positive indicator species (√ if present)																
Ammophila arenaria																
Elytrigia juncea																
Leymus arenarius																
2a. Negative indicator species (Domin)																
Arrhenatherum elatius																
Cirsium arvense																
Cirsium vulgare																
Lolium perenne																
Senecio jacobea																
Urtica dioica																
Other:																
Other:																
2b. Highest Domin score at each stop																
3. Non-native species (Domin)																
Name of species:																
Name of species:																
4. Green shoots and flowering in flowering season (√ if present)																

Notes:

1. Calculate % of habitat by averaging mid-range values for Domin score as follows:

Domin score Range Mid-range value (%)

- **+ A single individual, <1% cover 0.1**
- **1 2-3 individuals, <1% cover 0.3**
- **2 Several individuals, < 1% cover 0.7**
- **3 1-4% cover 2**
- **4 5-10% cover 7**
- **5 11-25% cover 18**
- **6 26-33% cover 29.5**
- **7 34-50% cover 42**
- **8 51-75% cover 68**
- **9 76-90% cover 83**
- **10 91-100% cover 95.5**

2. No failures = Favourable, 1-2 failures = Unfavourable - Inadequate, 3+ failures = Unfavourable – Bad

General site observations

Habitat assessment for the site				
Habitat assessment criteria	**Habitat assessment scores**		**Required to pass**	**Result (pass/fail)**
1. Positive indicator species	**% frequency**		*At least one species present in more than 40% of stops*	
Ammophila arenaria				
Elytrigia juncea				
Leymus arenarius				
2a. Negative indicator species	**% frequency**	**% of habitat[1]**	*No species present in more than 60% of stops and combined cover of negative indicators 5% or less and highest Domin score 5 or less*	
Arrhenatherum elatius				
Cirsium arvense				
Cirsium vulgare				
Lolium perenne				
Senecio jacobea				
Urtica dioica				
Other:				
Other:				
2b. Highest Domin score across all stops				
3. Non-native species	**% frequency**		*No species present in more than 20% of stops*	
Name of species:				
Name of species:				
4. Healthy shoots and flowering/fruiting of *A. arenaria*, *E. juncea* or *L. arenarius* according to season (% frequency)			*Observed in more than 40% of stops*	
5. Rare species	**% frequency**		*No declines since the last assessment.*	
6a. Coastal defences built pre-designation which currently affect the habitat due to modification of these structures or changes to the sediment cycle at the site (presence/absence)			*Both absent*	
6b. Post-designation anthropogenic impacts on the substrate/mobility of the system (e.g. new stabilisation works, sediment extraction) (presence/absence)				
7. Disturbance (e.g. trampling, vehicle damage, removal of substrate) affecting the habitat (% of habitat)			*No more than 20% of habitat*	
			No. of criteria failed	
			Habitat assessment[2]	

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

Monitoring stop data																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1a. Positive indicator species (√ if present)																
Aira praecox																
Anthyllis vulneraria																
Carex arenaria																
Carex flacca																
Cladonia spp.																
Crepis capillaris																
Daucus carota																
Erodium cicutarium																
Euphrasia officinalis agg.																
Festuca rubra																
Galium verum																
Hypochaeris radicata																
Linum catharticum																
Lotus corniculatus																
Luzula campestris																
Ononis repens																
Peltigera spp.																
Phleum arenarium																
Pilosella officinarum																
Plantago lanceolata																
Poa pratensis sens. lat.																
Rhinanthus minor																
Sedum acre																
Thymus polytrichus																
Trifolium repens																
Veronica chamaedrys																
Viola canina																
Viola riviniana																
Viola tricolor																
Agrostis capillaris																
Carex pilulifera																
Festuca ovina																
Galium saxatile																
Polygala serpyllifolia																
Potentilla erecta																
Deschampsia flexuosa																
Dicranum scoparium																
Homalothecium lutescens																
Hylocomium splendens																
Hypnum cupressiforme																
Pleurozium schreberi																
Syntrichia ruralis																
Rhytidiadelphus squarrosus																
Rhytidiadelphus triquetrus																
Scleropodium purum																
1b. Number of positive indicator species at each stop																

Habitat assessment for the site			
Habitat assessment criteria	**Habitat assessment scores**	**Required to pass**	**Result (pass/fail)**
1a. Positive indicator species	**% frequency**	*At least eight species present in more than 20% of stops*	
Aira praecox			
Anthyllis vulneraria			
Carex arenaria			
Carex flacca			
Cladonia spp.			
Crepis capillaris			
Daucus carota			
Erodium cicutarium			
Euphrasia officinalis agg.			
Festuca rubra			
Galium verum			
Hypochaeris radicata			
Linum catharticum			
Lotus corniculatus			
Luzula campestris			
Ononis repens			
Peltigera spp.			
Phleum arenarium			
Pilosella officinarum			
Plantago lanceolata			
Poa pratensis sens. lat.			
Rhinanthus minor			
Sedum acre			
Thymus polytrichus			
Trifolium repens			
Veronica chamaedrys			
Viola canina			
Viola riviniana			
Viola tricolor			
Agrostis capillaris			
Carex pilulifera			
Festuca ovina			
Galium saxatile			
Polygala serpyllifolia			
Potentilla erecta			
Deschampsia flexuosa			
Dicranum scoparium			
Homalothecium lutescens			
Hylocomium splendens			
Hypnum cupressiforme			
Pleurozium schreberi			
Syntrichia ruralis			
Rhytidiadelphus squarrosus			
Rhytidiadelphus triquetrus			
Scleropodium purum			
1b. Lowest number of positive indicator species in a monitoring stop		*At least four species present in every stop*	

2a. Negative indicator species (Domin)																	**2a. Negative indicator species**	**% frequency**	**% of habitat[1]**	*No species present in more than 60% of stops* and *combined cover of negative indicators 5% or less* and *highest Domin score 5 or less*	
Cirsium arvense																→	*Cirsium arvense*				
Cirsium vulgare																→	*Cirsium vulgare*				
Lolium perenne																→	*Lolium perenne*				
Pteridium aquilinum																→	*Pteridium aquilinum*				
Senecio jacobea																→	*Senecio jacobea*				
Pteridium aquilinum																→	*Pteridium aquilinum*				
Rosa spp.																→	*Rosa* spp.				
Rubus fruticosus agg.																→	*Rubus fruticosus* agg.				
Urtica dioica																→	*Urtica dioica*				
Other:																→	Other:				
2b. Highest Domin score at each stop																→	**2b. Highest Domin score across all stops**				
3. Non-native species (Domin within 20m radius)																	**3. Non-native species**	**% frequency**		*No species present in more than 20% of stops*	
Name of species:																→	Name of species:				
Name of species:																→	Name of species:				
4. Cover of trees and scrub other than *Juniperus* (Domin within20m radius)																→	**4a. Cover of trees and scrub other than *Juniperus* (% frequency)**			*Trees and scrub not recorded at more than 60% of stops* and *combined cover of 5% or less*	
																	4b. Cover of trees and scrub other than *Juniperus* (% of habitat[1])				
5. Trees/saplings from adjacent plantations (Domin within 20m radius)																→	**5. Trees/saplings from adjacent plantations (% frequency)**			*Present at not more than 20% of stops*	
6. Height of vegetation (cm)																→	**6. Height of vegetation: stops with height 2-10 cm (%)**			*30-70% of stops with appropriate vegetation height*	
7. Flowering and fruiting of any positive indicator species (√ if present)																→	**7. Flowering and fruiting of any positive indicator species (% frequency)**			*Present in 40% or more of stops*	

8. Bare sand (Domin)															

Notes :

1. Calculate % of habitat by averaging mid-range values for Domin score as follows:

Domin score	Range	Mid-range value (%)
+	A single individual, <1% cover	0.1
1	2-3 individuals, <1% cover	0.3
2	Several individuals, < 1% cover	0.7
3	1-4% cover	2
4	5-10% cover	7
5	11-25% cover	18
6	26-33% cover	29.5
7	34-50% cover	42
8	51-75% cover	68
9	76-90% cover	83
10	91-100% cover	95.5

2. No failures = Favourable, 1-2 failures = Unfavourable - Inadequate, 3+ failures = Unfavourable - Bad

3. Calculate the area of bare ground within the habitat at a site level by totalling the areas mapped as bare ground

8a. Bare sand (% of habitat from stops[1])		*Present but* <u>total</u> *area not more than10%*	
8b. Bare sand (% of habitat from map[3])			
9. Rare species	**% frequency in habitat**	*No declines since last assessment*	
10a. Coastal defences built pre-designation which currently affect the habitat due to modification of these structures or changes to the sediment cycle at the site (presence/absence)		*Both absent*	
10b. Post-designation anthropogenic impacts on the substrate/mobility of the system (e.g. new stabilisation works, sediment extraction) (presence/absence)			
11. Disturbance (e.g. trampling, vehicle damage, removal of substrate) affecting the habitat (% of habitat)		*No more than 20% of habitat*	
		No. of criteria failed	
		Habitat assessment[2]	

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

Monitoring stop data																	Habitat assessment for the site				
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Habitat assessment criteria	Habitat assessment score		Required to pass	Result (pass/fail)
1a. Positive indicator species (√ if present)																	**1a. Positive indicator species**	**% frequency**		*At least two species present in more than 40% of stops and another two species present in more than 20% of stops*	
Carex arenaria																	*Carex arenaria*				
Carex flacca																	*Carex flacca*				
*Euphrasia officinalis*agg.																	*Euphrasia officinalis*agg.				
Festuca rubra																	*Festuca rubra*				
Holcus lanatus																	*Holcus lanatus*				
Lotus corniculatus																	*Lotus corniculatus*				
Ononis repens																	*Ononis repens*				
Pilosella officinarum																	*Pilosella officinarum*				
Rhytidiadelphus squarrosus																	*Rhytidiadelphus squarrosus*				
Scleropodium purum																	*Scleropodium purum*				
*Salix repens*ssp. *argentea*																	*Salix repens*ssp. *argentea*				
1b. Number of positive indicator species at each stop																	**1b. Lowest number of positive indicator species in a monitoring stop**			*At least two species present in every stop*	
2a. Negative indicator species (Domin)																	**2a. Negative indicator species**	**% frequency**	**% of habitat[1]**	*No species present in more than 60% of stops <u>and</u> combined cover of negative indicators 5% or less <u>and</u> highest Domin score 5 or less*	
Cirsium arvense																	*Cirsium arvense*				
Cirsium palustre																	*Cirsium palustre*				
Cirsium vulgare																	*Cirsium vulgare*				
Lolium perenne																	*Lolium perenne*				
Pteridium aquilinum																	*Pteridium aquilinum*				
Senecio jacobea																	*Senecio jacobea*				
Urtica dioica																	*Urtica dioica*				
Other:																	Other:				
2b. Highest Domin score at each stop																	**2b. Highest Domin score across all stops**				
3. Non-native species (Domin)																	**3. Non-native species**	**% frequency**		*No species present in more than 20% of stops*	
Name of species:																	Name of species:				
Name of species:																	Name of species:				
4. Rank grasses (Domin)																	***4. Rank grasses***	**% of habitat[1]**		*Total area is less than 10%*	
Arrhenatherum elatius																	*Arrhenatherum elatius*				
Dactylis glomerata																	*Dactylis glomerata*				

5. Cover of trees and scrub other than *Salix repens* (Domin withn 20m radius)																
6. Height of *Salix repens*(cm)																
7. Bare sand (Domin)																

Notes :

1. Calculate % of habitat by averaging mid-range values for Domin score as follows:

Domin score	Range	Mid-range value (%)
+	A single individual, <1% cover	0.1
1	2-3 individuals, <1% cover	0.3
2	Several individuals, < 1% cover	0.7
3	1-4% cover	2
4	5-10% cover	7
5	11-25% cover	18
6	26-33% cover	29.5
7	34-50% cover	42
8	51-75% cover	68
9	76-90% cover	83
10	91-100% cover	95.5

2. No failures = Favourable, 1-2 failures = Unfavourable - Inadequate, 3+ failures = Unfavourable - Bad
3. Calculate the area of bare ground within the habitat at a site level by totalling the areas mapped as bare ground

General site observations

→	**5a. Cover of trees and scrub other than *Salix repens* (% frequency)**		*Trees and scrub present at no more than 40% of stops* <u>and</u> *combined cover of 5% or less*	
	5a. Cover of trees and scrub other than *Salix repens* (% of habitat[1])			
→	**6. Height of *Salix repens* (range)**		*All stops with height of 5 to 30 cm*	
→	**7a. Bare sand (% of habitat from stops[1])**		*Present but* <u>total</u> *area not more than10%*	
→	**7b. Bare sand (% of habitat from map[3])**			
→	**8. Rare species**	**% frequency**	*No declines since last assessment*	
→	**9a. Coastal defences built pre-designation which currently affect the habitat due to modification of these structures or changes to the sediment cycle at the site (presence/absence)**		*Both absent*	
→	**9b. Post-designation anthropogenic impacts on the substrate/mobility of the system (e.g. new stabilisation works, sediment extraction) (presence/absence)**			
→	**10. Disturbance (e.g. trampling, vehicle damage, removal of substrate) affecting the habitat (% of habitat)**		*No more than 20% of habitat*	
			No. of criteria failed	
			Habitat assessment[2]	

2190 Humid dune slacks

Monitoring stop data																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1a. Positive indicator species (√ if																
Anagallis tenella																
Bryum pseudotriquetrum																
Calliergon cuspidatum																
Campylium stellatum																
Carex arenaria																
Carex flacca																
Carex nigra																
*Dactylorhiza*spp.																
Epipactis palustris																
Equisetum spp.																
Galium palustre																
Hydrocotyle vulgaris																
Juncus articulatus																
Lotus corniculatus																
Mentha aquatica																
Potentilla anserina																
Prunella vulgaris																
Ranunculus flammula																
Sagina nodosa																
Salix repens ssp. *argentea*																
Agrostis stolonifera																
Festuca rubra																
1b. Number of positive indicator species at each stop																
2. Cover of bryophytes (Domin)																
3. Cover of *Salix repens* (%)																

Habitat assessment for the site			
Habitat assessment criteria	**Habitat assessment scores**	**Required to pass**	**Result (pass/fail)**
1a. Positive indicator species	**% frequency**	*At least four species present in more than 40% of stops and another two species present in more than 20% of stops*	
Anagallis tenella			
Bryum pseudotriquetrum			
Calliergon cuspidatum			
Campylium stellatum			
Carex arenaria			
Carex flacca			
Carex nigra			
*Dactylorhiza*spp.			
Epipactis palustris			
Equisetum spp.			
Galium palustre			
Hydrocotyle vulgaris			
Juncus articulatus			
Lotus corniculatus			
Mentha aquatica			
Potentilla anserina			
Prunella vulgaris			
Ranunculus flammula			
Sagina nodosa			
*Salix repens*sp. *argentea*			
Agrostis stolonifera			
Festuca rubra			
1b. Lowest number of positive indicator species in a monitoring stop		*At least three species present in every stop*	
2. Bryophytes	**% frequency**	*Present in more than 20% of stops*	
3. Cover of *Salix repens* (% of habitat[1])		*Less than 40%*	

4a. Negative indicator species (Domin)																	**4a. Negative indicator species**	**% frequency**	**% of habitat[1]**	*No species present in more than 60% of stops* <u>and</u> *combined cover of negative indicators 5% or less* <u>and</u> *highest Domin score 5 or less*	
Arrhenatherum elatius																→	*Arrhenatherum elatius*				
Cirsium arvense																→	*Cirsium arvense*				
Cirsium palustre																→	*Cirsium palustre*				
Cirsium vulgare																→	*Cirsium vulgare*				
Lolium perenne																→	*Lolium perenne*				
Pteridium aquilinum																→	*Pteridium aquilinum*				
Senecio jacobea																→	*Senecio jacobea*				
Urtica dioica																→	*Urtica dioica*				
Other:																→	Other (specify)				
4b. Highest Domin score at each stop																→	**4b. Highest Domin score across all stops**				
5. Non-native species (Domin)																	**5. Non-native species**	**% frequency**		*No species present in more than 20% of stops*	
Name of species:																→	Name of species:				
Name of species:																→	Name of species:				
6. Cover of scrub (Domin within 20m radius)																→	**6a. Cover of scrub (% frequency)**			*Scrub present in no more than 40% of stops* <u>and</u> *combined cover of 5% or less*	
																	6b. Cover of scrub (% of habitat[1])				

7. Forb cover to grass cover ratio (%:%)[4]															
8. Bare ground (Domin)															

Notes :

1. Calculate % of habitat by averaging mid-range values for Domin score as follows:

Domin score	Range	Mid-range value	(%)
+	A single individual,	<1% cover	0.1
1	2-3 individuals,	<1% cover	0.3
2	Several individuals,	< 1% cover	0.7
3	1-4%	cover	2
4	5-10%	cover	7
5	11-25%	cover	18
6	26-33%	cover	29.5
7	34-50%	cover	42
8	51-75%	cover	68
9	76-90%	cover	83
10	91-100%	cover	95.5

2. No failures = Favourable, 1-2 failures = Unfavourable - Inadequate, 3+ failures = Unfavourable - Bad.

3. Calculate the area of bare ground within the habitat at a site level by totalling the areas

General site observations

7. Forb: grass ratio (mean)		*Forb cover over 30%, grass cover below 70%*	
8a. Bare ground (% of habitat from stops[1])		*Present but total area not more than 5%*	
8b. Bare ground (% of habitat from map[3])			
9. Rare species	**% frequency**	*No declines since last assessment*	
10a. Coastal defences built pre-designation which currently affect the habitat due to modification of these structures or changes to the sediment cycle at the site (presence/absence)		*Both absent*	
10b. Post-designation anthropogenic impacts on the substrate/mobility of the system (e.g. new stabilisation works, sediment extraction) (presence/absence)			
11. Disturbance (e.g. trampling, vehicle damage, removal of substrate) affecting the habitat (% of habitat)		*No more than 20% of habitat*	
		No. of criteria failed	
		Habitat assessment[2]	

Recorded but not assessed:	
Embryonic slacks present? (Y/N)	
Algal mats present? (Y/N)	

*21A0 Machairs

Monitoring stop data																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1a. Positive indicator species (√ if present)																
Agrostis stolonifera																
Aira praecox																
Bellis perennis																
Carex arenaria																
Carex flacca																
Carex nigra																
Cerastium fontanum																
Crepis capillaris																
Euphrasia officinalis agg.																
Festuca rubra																
Galium verum																
Hydrocotyle vulgaris																
Linum catharticum																
Lotus corniculatus																
Orchid spp.																
Plantago lanceolata																
Potentilla anserina																
Prunella vulgaris																
Rhinanthus minor																
Sedum acre																
Thymus polytrichus																
Trifolium repens																
Viola canina																
Viola riviniana																
Viola tricolor																
1b. Number of positive indicator species at each stop																

Habitat assessment for the site			
Habitat assessment criteria	**Habitat assessment scores**	**Required to pass**	**Result (pass/fail)**
1a. Positive indicator species	**% frequency**	*At least six species present in more than 20% of stops*	
Agrostis stolonifera			
Aira praecox			
Bellis perennis			
Carex arenaria			
Carex flacca			
Carex nigra			
Cerastium fontanum			
Crepis capillaris			
Euphrasia officinalis agg.			
Festuca rubra			
Galium verum			
Hydrocotyle vulgaris			
Linum catharticum			
Lotus corniculatus			
Orchid spp.			
Plantago lanceolata			
Potentilla anserina			
Prunella vulgaris			
Rhinanthus minor			
Sedum acre			
Thymus polytrichus			
Trifolium repens			
Viola canina			
Viola riviniana			
Viola tricolor			
1b. Lowest number of positive indicator species in a monitoring		*At least three species present in every stop*	

2. Cover of bryophytes (Domin)																→
3a. Negative indicator species (Domin)																
Arrhenatherum elatius																→
Cirsium arvense																→
Cirsium vulgare																→
Senecio jacobea																→
Urtica dioica																→
Lolium perenne																→
Phleum pratense																→
Pteridium aquilinum																→
Other (include native invasive species):																→
3b. Highest Domin score at each stop																→
4. Non-native species (Domin)																
Name of species:																→
Name of species:																→
5. Flowering and fruiting of any positive indicator species (√ if present)																→
6. Height of vegetation (cm)																→

2. Cover of bryophytes (minimum % cover)			*Always over 1%*	
3a. Negative indicator species	**% frequency**	**% of habitat[1]**	*No species present in more than 40% of stops and L. perenne and P. pratense not present in more than 20% of stops and combined cover of negative indicators 5% or less and highest Domin score 5 or less*	
Arrhenatherum elatius				
Cirsium arvense				
Cirsium vulgare				
Senecio jacobea				
Urtica dioica				
Lolium perenne				
Phleum pratense				
Pteridium aquilinum				
Other:				
3b. Highest Domin score across all stops				
4. Non-native species	**% frequency**		*No species present in more than 20% of stops*	
Name of species:				
Name of species:				
5. Flowering and fruiting of any positive indicator species (% frequency)			*Present in more than 40% of stops*	
6. Sward height (mean)			*Mean height*	

7. Bare ground (Domin)																

Notes :

1. Calculate % of habitat by averaging mid-range values for Domin score as follows:

Domin score	Range	Mid-range value (%)
+	A single individual, <1% cover	0.1
1	2-3 individuals, <1% cover	0.3
2	Several individuals, < 1% cover	0.7
3	1-4% cover	2
4	5-10% cover	7
5	11-25% cover	18
6	26-33% cover	29.5
7	34-50% cover	42
8	51-75% cover	68
9	76-90% cover	83
10	91-100% cover	95.5

2. No failures = Favourable, 1-2 failures = Unfavourable - Inadequate, 3+ failures = Unfavourable - Bad

3. Calculate the area of bare ground within the habitat at a site level by totalling the areas mapped as bare ground

General site observations

7a. Bare ground (% of habitat from stops[1])		*Present but* total *area not more than5%*	
7b. Bare ground (% of habitat from map[3])			
8. Rare species	**% frequency**		
9a. Coastal defences built pre-designation which currently affect the habitat due to modification of these structures or changes to the sediment cycle at the site (presence/absence)		*Both absent*	
9b. Post-designation anthropogenic impacts on the substrate/mobility of the system (e.g. new stabilisation works, sediment extraction) (presence/absence)			
10. Disturbance (e.g. trampling, vehicle damage, removal of substrate) affecting the habitat (% of habitat)		*No more than 20% of habitat*	
		No. of criteria failed	

Appendix II: Calculation of percentage of 2170 Dunes with creeping willow in favourable condition

A: Assessment of Structure and Functions of each site										
Criterion	**Target**	**28 Cahore Point North**	**35 The Raven**	**75 Castlegregory**	**124 Aghleam**	**133 Strandhill**	**147 Maghera**	**148 Sheskinmore**	**162 Rinclevan**	**169 Lough Nagreany**
Positive indicator species	*At least two species present in more than 40% of stops and another two species present in more than 20% of stops. No stop with fewer than two positive indicator species.*	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Rare species	*No decline since last assessment*	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Negative indicator species	*No species present in more than 60% of stops and combined cover of negative indicators 5% or less and highest Domin score 5 or less*	Pass	Pass	Fail	Pass	Pass	Fail	Pass	Fail	Pass
Non-native species (specify)	*No species present in more than 20% of stops*	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Grasses indicating rank conditions	*Total cover is less than 10%*	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Cover of trees and scrub other than S. repens	*Trees and scrub present at no more than 40% of stops and combined cover of 5% or less*	Pass	Fail	Pass	Pass	Fail	Pass	Pass	Pass	Pass
Height of Salix repens	*All stops with height of 5 to 30 cm*	Fail	Fail	Pass	Fail	Pass	Fail	Pass	Pass	Pass
Bare ground	*Present but total area not more than 10%*	Fail	Pass	Pass	Pass	Fail	Pass	Pass	Pass	Pass
Interference with the sediment dynamics	*Absent*	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Disturbance (e.g. trampling, vehicle damage, removal of substrate) affecting the habitat	*Affecting no more than 20% of habitat*	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
Number of failed criteria	*0 failed criteria = Favourable* *1 or 2 failed criteria = Unfavourable-Inadequate* *>2 failed criteria = Unfavourable-Bad*	2	2	1	1	2	2	0	1	0
Site based assessment		**Unfavourable-Inadequate**	**Unfavourable-Inadequate**	**Unfavourable-Inadequate**	**Unfavourable-Inadequate**	**Unfavourable-Inadequate**	**Unfavourable-Inadequate**	**Favourable**	**Unfavourable-Inadequate**	**Favourable**

B: Calculation of Area in Favourable condition

Site	% of site Favourable	% of site Unfavourable	Surveyed area of habitat (ha)	Area Favourable (ha)	Area Unfavourable (ha)	Justification
28 Cahore Point North	0	100	0.07	0.00	0.07	Entire habitat affected by excessively tall Salix repens and lack of bare ground.
35 The Raven	25	75	2.25	0.56	1.69	Scrub affects 80% of the habitat, and *Salix repens* is excessively tall at one stop. Scrub encroachment and excessively tall *Salix repens* should be eliminated at 75% of the site.
75 Castlegregory	60	40	32.13	19.28	12.85	*Lolium perenne* and *Senecio jacobaea* are widespread, affecting all stops. These species should be eliminated from at least 40% of the area of the habitat.
124 Aghleam	91.7	8.3	39.43	36.15	3.27	Vegetation was excessibely tall at one monitoring stop representing 8.3% of the habitat.
133 Strandhill	80	20	11.26	9.00	2.25	Scrub (including young conifer species) affects 25% of this habitat.
147 Maghera	80.7	19.3	3.12	2.52	0.60	*Salix repens* is excessively tall in 12.3% of the habitat and *Pteridium aquilinum* affects another 12% of the habitat. Management is required in at least 19.3% of the habitat.
148 Sheskinmore	100	0	2.50	2.50	0.00	All the criteria passed at this site.
162 Rinclevan	85	15	9.04	7.69	1.36	Negative indicator species affect 75% of the habitat but have a very low percentage cover. These species should be eliminated from at least 15% of the habitat.
169 Lough Nagreany	100	0	0.98	0.98	0.00	All the criteria passed at this site.
Total			100.78	78.69	22.09	

C: Assessment of Structure and Functions of total habitat area

Habitat	% of habitat Favourable	% of habitat Unfavourable	Surveyed area of habitat (ha)	Area Favourable (ha)	Area Unfavourable (ha)	Habitat based assessment	Justification
2170 Dunes with creepting willow	**78.08**	**21.92**	**100.78**	**78.69**	**22.09**	**Unfavourable-inadequate**	The area in Unfavourable condition was over 1% and less than 25%, so Structure and Functions were assessed as Unfavourable-Inadequate.

Appendix III: BSBI Guidance notes for recording DAFOR scores

D = Dominant; **A** = Abundant, **F** = Frequent, **O** = Occasional, **R** = Rare.

D FOR DOMINANT

In practice you will rarely, if ever use this. To score **D,** a species would have to be the most common plant by far, in well over three quarters of the square. It is possible that, in a square that is entirely conifer plantation, Sitka spruce *Picea sitchensis* might score **D;** or in a square that is almost all occupied by highly improved grassland, perennial rye-grass *Lolium perenne* might sometimes score **D**, but even these two scenarios are unlikely most of the time. If you are not sure if something should score **D** or **A**, give it **A**.

A FOR ABUNDANT

Only use **A** if the plant was really very common in many parts of the square. For most species this would mean that there were thousands of individual plants present. In most squares, few species will score as highly as **A** and in quite a few squares there will be no species that score that highly. If you are not sure if something should score **A** or **F**, give it **F**.

F FOR FREQUENT

Use **F** if you found the plant in several places in the square and there was usually more than just a few individuals in each of these places. You could also use **F** if the plant was only present in one part of the square but was very common in that part, with many individuals and covered a substantial area (e.g. between one eighth and one quarter of the area of the whole square). If you are not sure if something should score **F** or **O**, give it **O**.

O FOR OCCASIONAL

Use **O** for species that occur in several places in the square, but whose populations are usually not very big. You would also use **O** for species that are very common in one bit of habitat within the square that occupied just a small area (e.g. less than one eighth of the area of the whole square). You will use **O** for many species in most squares. If you are not sure if something should score **O** or **R,** give it **R**.

R FOR RARE

Use **R** for any species that occur as a small number of individuals in the square. This small number of individuals may be located in one place in the square, or scattered over several different locations within the square. In many squares **R** is likely to be the score that most species get. If you are not sure if something should score **O** or **R,** give it **R**.

When DAFOR scores were converted to percentage cover, D was taken to equal 68%, A was taken to equal 29.5%, F was taken to equal 18%, O was taken to equal 2% and R was taken to equal 0.7%.

Appendix IV: Main changes to the conservation assessment criteria

Habitat	Criterion	SDM Target (2011/2012)	CMP Target (2004-2006)
All habitats	Positive indicator species	Frequency of positive indicator species assessed across all monitoring stops (number of positive indicator species within each monitoring stop also assessed for some habitats)	Number of positive indicator species assessed in each monitoring stop.
All habitats	Coastal defences	No change since designation	Not assessed
All habitats	Disturbance	Rare across the site	Not assessed
All habitats	Rare species	No decline since last assessment	Not assessed
2110 Embryonic shifting dunes	Healthy vegetation and flowering/fruiting of *Elytrigia juncea* & *Leymus arenarius*	Dominant, Abundant, Frequent within habitat, flowering season taken into account	Unhealthy *Elytrigia juncea* and/or *Leymus arenarius* singly or together no greater than 5% within stop
2120 Marram dunes (white dunes)	Healthy vegetation and flowering/fruiting of *Elytrigia juncea* & *Leymus arenarius*	Dominant, Abundant, Frequent within habitat, flowering season taken into account	Unhealthy *Ammophila arenaria* and *Leymus arenarius* singly or together no greater than 5%
2120 Marram dunes (white dunes)	*Hippophae rhamnoides*	Absent	Not assessed
*2130 Fixed dunes (grey dunes)	Negative indicator species	Frequency of negative indicator species assessed across all monitoring stops as well as total number of species within the stop.	Frequency of negative indicator species assessed in each monitoring stop.
*2130 Fixed dunes (grey dunes)	Cover of trees and scrub	One species Frequent, Occasional, Rare, Absent and total cover 5% or less	Not assessed
*2130 Fixed dunes (grey dunes)	Trees/saplings from adjacent plantations	Rare, Absent	Not assessed
*2130 Fixed dunes (grey dunes)	Flowering and fruiting	Frequent, Abundant, Dominant within the habitat	At least Frequent (20% of vegetation within stop)
*2130 Fixed dunes (grey dunes)	Bare ground	Present but not more than 10% in habitat	No more than 10% within stop
*2130 Fixed dunes (grey dunes)	Height of vegetation	30-70% of the whole Annex I habitat between 2-10cm	No greater than 20cm and no less than 5cm within the stop
2170 Dunes with creeping willow	Negative indicator species	*Urtica dioica* present on list *Holcus lanatus* removed from list	*Urtica dioica* absent from list *Holcus lanatus* present on list
2190 Humid dune slacks	Typical species	Same list applied to all slack types. Old, dry slacks are no longer humid, so they are considered elsewhere (generally 2130 Fixed dunes (grey dunes) or 2170 Dunes with creeping willow). Embryonic dune slacks noted separately on the recording sheet.	Separate species list for each of 5 types. *2130 Fixed dunes (grey dunes) species included in the list for old, dry slacks
*21A0 Machairs	Native invasive species (*Pteridium aquilinum*, *Petasites* spp. etc.)	Assessed under the negative indicator species criterion.	No more than 5% cover within any monitoring stop.
*21A0 Machairs	Flowering and fruiting of vegetation	At least Frequent across the site	At least occasional within each monitoring stop.
*21A0 Machairs	Bare ground	Up to 5% across the whole site, but must be present.	0-10% cover within each monitoring stop.
*21A0 Machairs	Sward height	Average >8 cm in July/August	2-10cm in each stop.

Appendix V: Impacts and codes used for future prospects assessments (Ssymank 2010)

Code	Impact
A	***Agriculture***
A01	Cultivation
A02	Modification of cultivation practices
A02.01	Agricultural intensification
A02.02	Crop change
A02.03	Grassland removal for arable land
A03	Mowing / cutting of grassland
A03.01	Intensive mowing or intensification
A03.02	Non intensive mowing
A03.03	Abandonment / lack of mowing
A04	Grazing
A04.01	Intensive grazing
A04.01.01	Intensive cattle grazing
A04.01.02	Intensive sheep grazing
A04.01.03	Intensive horse grazing
A04.01.04	Intensive goat grazing
A04.01.05	Intensive mixed animal grazing
A04.02	Non-intensive grazing
A04.02.01	Non-intensive cattle grazing
A04.02.02	Non-intensive sheep grazing
A04.02.03	Non-intensive horse grazing
A04.02.04	Non-intensive goat grazing
A04.02.05	Non-intensive mixed animal grazing
A04.03	Abandonment of pastoral systems, lack of grazing
A05	Livestock farming and animal breeding (without grazing)
A05.01	Animal breeding
A05.02	Stock feeding
A05.03	Lack of animal breeding
A06	Annual and perennial non-timber crops
A06.01	Annual crops for food production
A06.01.01	Intensive annual crops for food production/ intensification
A06.01.02	Non-intensive annual crops for food production
A06.02	Perennial non-timber crops
A06.02.01	Intensive perennial non-timber crops/intensification
A06.02.02	Non-intensive perennial non-timber crops
A06.03	Biofuel-production
A06.04	Abandonment of crop production
A07	Use of biocides, hormones and chemicals
A08	Fertilisation
A09	Irrigation
A10	Restructuring agricultural land holding

Code	Impact
A10.01	Removal of hedges and copses or scrub
A10.02	Removal of stone walls and embankments
A11	Agriculture activities not referred to above
B	***Sylviculture, forestry***
B01	Forest planting on open ground
B01.01	Forest planting on open ground (native trees)
B01.02	Artificial planting on open ground (non-native trees)
B02	Forest and Plantation management & use
B02.01	Forest replanting
B02.01.01	Forest replanting (native trees)
B02.01.02	Forest replanting (non native trees)
B02.02	Forestry clearance
B02.03	Removal of forest undergrowth
B02.04	Removal of dead and dying trees
B02.05	Non- intensive timber production (leaving dead wood/ old trees untouched)
B02.06	Thinning of tree layer
B03	Forest exploitation without replanting or natural regrowth
B04	Use of biocides, hormones and chemicals (forestry)
B05	Use of fertilizers (forestry)
B06	Grazing in forests/ woodland
B07	Forestry activities not referred to above
C	***Mining, extraction of materials and energy production***
C01	Mining and quarrying
C01.01	Sand and gravel extraction
C01.01.01	Sand and gravel quarries
C01.01.02	Removal of beach materials
C01.02	Loam and clay pits
C01.03	Peat extraction
C01.03.01	Hand cutting of peat
C01.03.02	Mechanical removal of peat
C01.04	Mines
C01.04.01	Open cast mining
C01.04.01	Underground mining
C01.05	Salt works
C01.05.01	Abandonment of saltpans (salinas)
C01.05.02	Conversion of saltpans
C01.06	Geotechnical survey
C01.07	Mining and extraction activities not referred to above
C02	Exploration and extraction of oil or gas
C02.01	Exploration drilling

Code	Impact
C02.02	Production drilling
C02.03	Jack-up drilling rig
C02.04	Semi-submersible rig
C02.05	Drill ship
C03	Renewable abiotic energy use
C03.01	Geothermal power production
C03.02	Solar energy production
C03.03	Wind energy production
C03.04	Tidal energy production
D	***Transportation and service corridors***
D01	Roads, paths and railroads
D01.01	Paths, tracks, cycling tracks
D01.02	Roads, motorways
D01.03	Car parks and parking areas
D01.04	Railway lines, TGV
D01.05	Bridge, viaduct
D01.06	Tunnel
D02	Utility and service lines
D02.01	Electricity and phone lines
D02.01.01	Suspended electricity and phone lines
D02.01.02	Underground electricity and phone lines
D02.02	Pipe lines
D02.03	Communication masts and antennas
D02.09	Other forms of energy transport
D03	Shipping lanes, ports, marine constructions
D03.01	Port areas
D03.01.01	Slipways
D03.01.02	Piers / tourist harbours or recreational piers
D03.01.03	Fishing harbours
D03.01.04	Industrial ports
D03.02	Shipping lanes
D03.02.01	Cargo lanes
D03.02.02	Passenger ferry lanes (high speed)
D03.03	Marine constructions
D04	Airports, flightpaths
D04.01	Airport
D04.02	Aerodrome, heliport
D04.03	Flight paths
D05	Improved access to site
D06	Other forms of transportation and communication
E	***Urbanisation, residential and commercial development***
E01	Urbanised areas, human habitation

Code	Impact
E01.01	Continuous urbanisation
E01.02	Discontinuous urbanisation
E01.03	Dispersed habitation
E01.04	Other patterns of habitation
E02	Industrial or commercial areas
E02.01	Factory
E02.02	Industrial stockage
E02.03	Other industrial / commercial area
E03	Discharges
E03.01	Disposal of household / recreational facility waste
E03.02	Disposal of industrial waste
E03.03	Disposal of inert materials
E03.04	Other discharges
E03.04.01	Costal sand suppletion/ beach nourishment
E04	Structures, buildings in the landscape
E04.01	Agricultural structures, buildings in the landscape
E04.02	Military constructions and buildings in the landscape
E05	Storage of materials
E06	Other urbanisation, industrial and similar activities
E06.01	Demolishment of buildings & human structures
E06.02	Reconstruction, renovation of buildings
F	***Biological resource use other than agriculture & forestry***
F01	Marine and freshwater aquaculture
F01.01	Intensive fish farming, intensification
F01.02	Suspension culture
F01.03	Bottom culture
F02	Fishing and harvesting aquatic resources
F02.01	Professional passive fishing
F02.01.01	Potting
F02.01.02	Netting
F02.01.03	Demersal longlining
F02.01.04	Pelagic longlining
F02.02	Professional active fishing
F02.02.01	Benthic or demersal trawling
F02.02.02	Pelagic trawling
F02.02.03	Demersal seining
F02.02.04	Purse seining
F02.02.05	Benthic dredging
F02.03	Leisure fishing
F02.03.01	Bait digging / collection
F02.03.02	Pole fishing
F02.03.03	Spear fishing
F03	Hunting and collection of wild animals (terrestrial)

Code	Impact
F03.01	Hunting
F03.01.01	Damage caused by game (excess population density)
F03.02	Taking and removal of animals (terrestrial)
F03.02.01	Collection of animals (insects, reptiles, amphibians.....)
F03.02.02	Taking from nest (e.g. falcons)
F03.02.03	Trapping, poisoning, poaching
F03.02.04	Predator control
F03.02.05	Accidental capture
F03.02.09	Other forms of taking animals
F04	Taking / Removal of terrestrial plants, general
F04.01	Pillaging of floristic stations
F04.02	Collection (fungi, lichen, berries etc.)
F04.02.01	Hand raking
F04.02.02	Hand collection
F05	Illegal taking / removal of marine fauna
F05.01	Dynamite
F05.02	Date mussel-fishing
F05.03	Poisons
F05.04	Poaching
F05.05	Shooting
F05.06	Removal for collection purposes
F05.07	Other (e.g. drift nets)
F06	Hunting, fishing or collecting activities not referred to above
F06.01	Game/ bird breeding station
G	***Human intrusions and disturbances***
G01	Outdoor sports and leisure activities, recreational activities
G01.01	Nautical sports
G01.01.01	Motorized nautical sports
G01.01.02	Non-motorized nautical sports
G01.02	Walking, horse-riding and non-motorised vehicles
G01.03	Motorised vehicles
G01.03.01	Regular motorised driving
G01.03.02	Off-road motorised driving
G01.04	Mountaineering, rock climbing, speleology
G01.04.01	Mountaineering & rock climbing
G01.04.02	Speleology
G01.04.03	Recreational cave visits
G01.05	Gliding, delta plane, paragliding, ballooning
G01.06	Skiing, off-piste
G01.07	Scubadiving, snorkelling
G01.08	Other outdoor sports and leisure activities
G02	Sport and leisure structures
G02.01	Golf course

Code	Impact
G02.02	Skiing complex
G02.03	Stadium
G02.04	Circuit, track
G02.05	Hippodrome
G02.06	Attraction park
G02.07	Sports pitch
G02.08	Camping and caravans
G02.09	Wildlife watching
G02.10	Other sport / leisure complexes
G03	Interpretative centres
G04	Military use and civil unrest
G04.01	Military manoeuvres
G04.02	Abandonment of military use
G05	Other human intrusions and disturbances
G05.01	Trampling, overuse
G05.02	Shallow surface abrasion / mechanical damage to seabed surface
G05.03	Penetration / disturbance below surface of the seabed
G05.04	Vandalism
G05.05	Intensive maintenance of public parks / cleaning of beaches
G05.06	Tree surgery, felling for public safety, removal of roadside trees
G05.07	Missing or wrongly directed conservation measures
G05.08	Closures of caves or galleries
G05.09	Fences, fencing
G05.10	Overflying with aircrafts (agricultural)
G05.11	Death or injury by collision
H	***Pollution***
H01	Pollution to surface waters (limnic & terrestrial)
H01.01	Pollution to surface waters by industrial plants
H01.02	Pollution to surface waters by storm overflows
H01.03	Other point source pollution to surface water
H01.04	Diffuse pollution to surface waters via storm overflows or urban run-off
H01.05	Diffuse pollution to surface waters due to agricultural and forestry activities
H01.06	Diffuse pollution to surface waters due to transport and infrastructure without connection to
H01.07	Diffuse pollution to surface waters due to abandoned industrial sites
H01.08	Diffuse pollution to surface waters due to household sewage and waste waters
H01.09	Diffuse pollution to surface waters due to other sources not listed
H02	Pollution to groundwater (point sources and diffuse sources)
H02.01	Groundwater pollution by leakages from contaminated sites
H02.02	Groundwater pollution by leakages from waste disposal sites
H02.03	Groundwater pollution associated with oil industry infrastructure
H02.04	Groundwater pollution by mine water discharges
H02.05	Groundwater pollution by discharge to ground such as disposal of contaminated water to
H02.06	Diffuse groundwater pollution due to agricultural and forestry activities

Code	Impact
H02.07	Diffuse groundwater pollution due to non-sewered population
H02.08	Diffuse groundwater pollution due to urban land use
H03	Marine water pollution
H03.01	Oil spills in the sea
H03.02	Toxic chemical discharge from material dumped at sea
H03.02.01	Non-synthetic compound contamination
H03.02.02	Synthetic compound contamination
H03.02.03	Radionucleide contamination
H03.02.04	Introduction of other substances (e.g. liquid, gas)
H03.03	Marine macro-pollution (e.g. plastic bags, styrofoam)
H04	Air pollution, air-borne pollutants
H04.01	Acid rain
H04.02	Nitrogen-input
H04.03	Other air pollution
H05	Soil pollution and solid waste (excluding discharges)
H05.01	Garbage and solid waste
H06	Excess energy
H06.01	Noise nuisance, noise pollution
H06.01.01	Point source or irregular noise pollution
H06.01.02	Diffuse or permanent noise pollution
H06.02	Light pollution
H06.03	Thermal heating of water bodies
H06.04	Electromagnetic changes
H07	Other forms of pollution
I	***Invasive, other problematic species and genes***
I02	Problematic native species
I03	Introduced genetic material, GMO
I03.01	Genetic pollution (animals)
I03.02	Genetic pollution (plants)
J	***Natural System modifications***
J01	Fire and fire suppression
J01.01	Burning down
J01.02	Suppression of natural fires
J01.03	Lack of fires
J02	Human induced changes in hydraulic conditions
J02.01	Landfill, land reclamation and drying out, general
J02.01.01	Polderisation
J02.01.02	Reclamation of land from sea, estuary or marsh
J02.01.03	Infilling of ditches, dykes, ponds, pools, marshes or pits
J02.01.04	Recultivation of mining areas
J02.02	Removal of sediments (mud...)
J02.02.01	Dredging / removal of limnic sediments

Code	Impact
J02.02.02	Estuarine and coastal dredging
J02.03	Canalisation & water deviation
J02.03.01	Large scale water deviation
J02.03.02	Canalisation
J02.04	Flooding modifications
J02.04.01	Flooding
J02.04.02	Lack of flooding
J02.05	Modification of hydrographic functioning, general
J02.05.01	Modification of water flow (tidal & marine currents)
J02.05.02	Modifying structures of inland water courses
J02.05.03	Modification of standing water bodies
J02.05.04	Reservoirs
J02.05.05	Small hydropower projects, weirs
J02.05.06	Wave exposure changes
J02.06	Water abstractions from surface waters
J02.06.01	Surface water abstractions for agriculture
J02.06.02	Surface water abstractions for public water supply
J02.06.03	Surface water abstractions by manufacturing industry
J02.06.04	Surface water abstractions for the production of electricity (cooling)
J02.06.05	Surface water abstractions by fish farms
J02.06.06	Surface water abstractions by hydro-energy
J02.06.07	Surface water abstractions by quarries/ open cast (coal) sites
J02.06.08	Surface water abstractions for navigation
J02.06.09	Surface water abstractions for water transfer
J02.06.10	Other major surface water abstractions
J02.07	Water abstractions from groundwater
J02.07.01	Groundwater abstractions for agriculture
J02.07.02	Groundwater abstractions for public water supply
J02.07.03	Groundwater abstractions by industry
J02.07.04	Groundwater abstractions by quarries/open cast (coal)sites
J02.07.05	Other major groundwater abstractions from groundwater for agriculture
J02.08	Raising the groundwater table / artificial recharge of groundwater
J02.08.01	Discharges to groundwater for artificial recharge purposes
J02.08.02	Returns of groundwater to GWB from which it was abstracted
J02.08.03	Mine water rebound
J02.08.04	Other major groundwater recharge
J02.09	Saltwater intrusion of groundwater
J02.09.01	Saltwater intrusion
J02.09.02	Other intrusion
J02.10	Management of aquatic and bank vegetation for drainage purposes
J02.11	Siltation rate changes, dumping, depositing of dredged deposits
J02.11.01	Dumping, depositing of dredged deposits
J02.11.02	Other siltation rate changes
J02.12	Dykes, embankments, artificial beaches, general

Code	Impact
J02.12.01	Sea defence or coast protection works, tidal barrages
J02.12.02	Dykes and flooding defence in inland water systems
J02.13	Abandonment of management of water bodies
J02.14	Altered water quality due to anthropogenic changes in salinity
J02.15	Other human induced changes in hydraulic conditions
J03	Other ecosystem modifications
J03.01	Reduction or loss of specific habitat features
J03.01.01	Reduction of prey availability (including carcasses)
J03.02	Anthropogenic reduction of habitat connectivity
J03.02.01	Reduction in migration / migration barriers
J03.02.02	Reduction in dispersal
J03.02.03	Reduction in genetic exchange
J03.03	Reduction, lack or prevention of erosion
J03.04	Applied (industrial) destructive research
K	***Natural biotic and abiotic processes (without catastrophes)***
K01	Abiotic (slow) natural processes
K01.01	Erosion
K01.02	Silting up
K01.03	Drying out
K01.04	Submersion
K01.05	Soil salinisation
K02	Biocenotic evolution, succession
K02.01	Species composition change (succession)
K02.02	Accumulation of organic material
K02.03	Eutrophication (natural)
K02.04	Acidification (natural)
K03	Interspecific faunal relations
K03.01	Competition (fauna)
K03.02	Parasitism (fauna)
K03.03	Introduction of disease (microbial pathogens)
K03.04	Predation
K03.05	Antagonism arising from introduction of species
K03.06	Antagonism with domestic animals
K03.07	Other forms of interspecific faunal competition
K04	Interspecific floral relations
K04.01	Competition (flora)
K04.02	Parasitism (flora)
K04.03	Introduction of disease (microbial pathogens)
K04.04	Lack of pollinating agents
K04.05	Damage by herbivores (including game species)
K05	Reduced fecundity / genetic depression
K05.01	Reduced fecundity / genetic depression in animals (inbreeding)
K05.02	Reduced fecundity / genetic depression in plants (incl. endogamy)

Code	Impact
K06	Other forms or mixed forms of interspecific floral competition
L	***Geological events, natural catastrophes***
L01	Volcanic activity
L02	Tidal wave, tsunamis
L03	Earthquake
L04	Avalanche
L05	Collapse of terrain, landslide
L06	Underground collapses
L07	Storm, cyclone
L08	Inundation (natural processes)
L09	Fire (natural)
L10	Other natural catastrophes
M	***Climate change***
M01	Changes in abiotic conditions
M01.01	Temperature changes (e.g. rise of temperatures & extremes)
M01.02	Droughts and less precipitations
M01.03	Flooding and rising precipitations
M01.04	pH changes
M01.05	Water flow changes (limnic, tidal and oceanic)
M01.06	Wave exposure changes
M01.07	Sea-level changes
M02	Changes in biotic conditions
M02.01	Habitat shifting and alteration
M02.02	Desynchronisation of processes
M02.03	Decline or extinction of species
M02.04	Migration of species (natural newcomers)
X	***No threats or pressures***
XO	Threats and pressures from outside the Member State
XE	Threats and pressures from outside the EU territory

Appendix VI: Future Prospects recording form

Site code	Annex I habitat	Impact code	Impact description	Intensity			Effect			% Habitat	Source
		e.g. A04.01	eg. intensive grazing	H	M	Low	-	0	+	≤1% or nearest 5%	inside or outside
000	**2130**	**A04.01.01**	**Intensive cattle grazing**	✓			✓			**20%**	**inside**