# Slyne Head Peninsula SAC (site code 2074)
# Conservation objectives supporting document -coastal habitats

**NPWS**

**Version 1**

**January 2015**

**Table of Contents**

*Please note that the opinions expressed in the site reports from the Saltmarsh Monitoring Project (SMP), Coastal Monitoring Project (CMP) and Sand Dunes Monitoring Project (SDM) are those of the authors and do not necessarily reflect the opinion or policy of NPWS.*

**Please note that this document should be read in conjunction with the following report: NPWS (2014). Conservation Objectives: Slyne Head Peninsula SAC 002074. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.**

## 1 Introduction

Achieving Favourable Conservation Status (FCS) is the overall objective to be reached for all Annex I habitat types and Annex II species of European Community interest listed in the Habitats Directive 92/43/EEC (Commission of the European Communities, 2007). It is defined in positive terms, such that a habitat type or species must be prospering and have good prospects of continuing to do so.

Slyne Head Peninsula SAC comprises the entire peninsula west of Ballyconneely in Connemara and includes much of Mannin Bay. The peninsula is low-lying and undulating, reaching a maximum height of only 64m (Doon Hill). The underlying rock is predominantly gneiss, except for schist along the northern shores of Mannin Bay, a granite ridge along the western edge of the peninsula and a conspicuous basalt exposure which forms Doon Hill. Coral strands consisting of fragments of the calcareous skeletons of red algae occur in Mannin Bay and south of Ballyconneely. The peninsula is fringed with rocky shores and sandy beaches, with some extensive areas of machair and several brackish lakes and lagoons. Inland there is a mosaic of habitats dominated by grassland and heath, interspersed with numerous lakes and associated swamp, marsh and fen. An important feature of the site is the influence of windblown calcareous sand on these habitats.

Machair gives way to bare sand in places with embryonic shifting dunes. Sandy beaches occur at the seaward side of the machair, some of which are 'coral' strands composed of chalky skeletons of red algae (*Lithothamnion* sp. and *Phymatolithion* sp.). Above the beaches typical driftline vegetation and shingle is found. Parts of the shoreline, particularly east of Mannin machair, are fringed with saltmarsh vegetation developed on peat.

Slyne Head Peninsula SAC supports a range of marine, coastal and terrestrial habitats including reefs, coastal lagoons, shallow inlets and bays, saltmarshes, machair, heaths, lakes, dry grassland, hay meadows and alkaline fens. Machair is particularly well developed at this SAC and forms extensive plains throughout the Peninsula. The rare petalwort (*Petallophyllum ralfsii*), a liverwort species listed under Annex II of the EU Habitats Directive, occurs within damp hollows on the machair plains. In fact, Slyne Head supports the largest known population nationally and internationally of *P. ralfsii*. Due to the presence of this population as well as a number of additional important byrophytes including *Bryum calaphyllum*, *Catascopium nigritum* and *Thuidium recognitum*, Slyne Head is recognised as an Important Bryophyte Area (IBrA) (Lockhart *et al*., 2012).

The site is also important for slender naiad (*Najas flexilis*), which occurs in some of the lakes. The following seven coastal habitats are included in the qualifying interests for the site (* denotes a priority habitat):

- Perennial vegetation of stony banks (1220)
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (ASM) (1330)
- Mediterranean salt meadows (Juncetaliea maritimi) (MSM) (1410)
- Annual vegetation of drift lines (1210)
- Embryonic shifting dunes (2110)
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2120)
- Machair (21A0)*

The first habitat represents vegetated shingle, the next two are saltmarsh habitats and the last four are associated with sand dune systems, machair being a complex sand dune habitat that is generally found on flat coastal plains that have a history of grazing. All seven of these habitats are found in close association with each other. Fixed dune, Humid dune slacks and Dune with *Salix repens* ssp. *argentea* (Salicion arenaria) were also recorded at this SAC during the Coastal Monitoring Project (CMP) (Ryle *et al*., 2009).

The known distribution of saltmarsh habitats is presented in Appendix I, although the extent is likely to be greater as fringing saltmarshes are thought to be frequent throughout the site. The distribution of sand dune habitats, including machair is presented in Appendix II.

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

The targets set for the **vegetated shingle** are based in part on the findings of the National Shingle Beach Survey (NSBS), which was carried out in 1999 on behalf of the National Parks and Wildlife Service (NPWS) (Moore & Wilson, 1999) and the Coastal Monitoring Project (Ryle *et al*., 2009), which recorded small areas of vegetated shingle at Ballyconneely and Doonloughan. The Sand Dune Monitoring Project (SDM) resurveyed the site at Doonloughan but did not record the presence of this habitat (Delaney *et al*., 2013). As the site was not visited during the NSBS, the conservation objective for the vegetated shingle habitat within the entire SAC is quite generic and may be adjusted in the future in light of new information.

The targets set for the **saltmarsh habitats** are based primarily on the results of the Saltmarsh Monitoring Project (SMP) (McCorry & Ryle, 2009) and this document should be read in conjunction with that report.

The SMP surveyed, mapped and assessed one sub-site within Slyne Head Peninsula SAC (McCorry & Ryle, 2009):

1. Erriseask

As part of the SMP, detailed individual reports and habitat maps were produced for each sub-site and that for Erriseask is included in Appendix III.

The conservation objectives for the saltmarsh habitats in Slyne Head Peninsula SAC are based on the findings of the individual report for this sub-site. There are additional areas of saltmarsh known to be present within the site, however, it is estimated that the sub-site as surveyed by the SMP represents approximately 50% of the total area of saltmarsh within Slyne Head Peninsula SAC.

The targets set for the **sand dune habitats** are based primarily on the results of the Coastal Monitoring Project (CMP) (Ryle *et al.*, 2009) and the Sand Dunes Monitoring Project (SDM) (Delaney *et al*., 2013). This document should be read in conjunction with those reports. Crawford *et al*. (1996) and Gaynor (2006, 2008) provide additional information on machair in Ireland.

The CMP was a comprehensive national baseline survey of all known sand dune systems in Ireland. A total of four sub-sites were surveyed, mapped and assessed within Slyne Head Peninsula SAC. The sub-sites are:

1. Ballyconneely
2. Mannin Bay
3. Aillebrack
4. Doonloughan

As part of the Coastal Monitoring Project (CMP) detailed individual reports and habitat maps were produced for all sub-sites and those compiled for Ballyconneely and Mannin Bay are included in a set of Appendices to this document (Appendix IV and V).

The SDM subsequently reviewed and modified the methodology used during the CMP to map and assess the conservation status of dune habitats. A subset of 40 sites (including Aillebrack and Doonloughan) was selected as a representative sample of the national dune resource for the SDM survey.

As part of the SDM, detailed individual reports and habitat maps (a revised baseline habitat map and an updated habitat map) were produced for each sub-site and the relevant ones for Aillebrack and Doonloughan are included in Appendix VI and VII.

The conservation objectives for the sand dune habitats (including machair) in Slyne Head Peninsula are based on the findings of the individual reports for each of these sites from both the

CMP (Ryle et al., 2009) and the SDM (Delaney *et al*., 2013), combined with the results of Gaynor (2008). It is thought that the four sub-sites as surveyed by the CMP and SDM represent the total area of sand dunes within Slyne Head Peninsula SAC.

## 2 Conservation Objectives

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

## 3 Perennial vegetation of stony banks

Perennial vegetation of stony banks is vegetation that is found at or above the mean high water spring tide mark on shingle beaches (i.e., beaches composed of cobbles and pebbles). It is dominated by perennial species (i.e. plants that continue to grow from year to year). The first species to colonise are annuals or short-lived perennials that are tolerant of periodic displacement or overtopping by high tides and storms. Level, or gently-sloping, high-level mobile beaches, with limited human disturbance, support the best examples of this vegetation. More permanent ridges are formed by storm waves. Several of these storm beaches may be piled against each other to form extensive structures.

### 3.1 Overall Objective

In the absence of detailed information on the nature and distribution of 'perennial vegetation of stony banks' in Slyne Head Peninsula SAC, the overall objective is to 'maintain the favourable conservation condition'. This objective is based on an assessment of the condition of the habitat under a range of attributes and targets. The assessment is divided into three main headings (a) Range, (b) Area and (c) Structure and Functions.

### 3.2 Area

#### 3.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target for favourable condition is *'no decrease in extent from the established baseline'*.

Bearing in mind that coastal systems are naturally dynamic and subject to change even within a season, this target is assessed subject to natural processes, including erosion and succession.

The current extent of this habitat in Slyne Head Peninsula is unknown. The National Shingle Beach Survey (NSBS) (Moore & Wilson, 1999) did not visit this site, but two small areas of vegetated shingle were recorded and mapped at Doonloughan (0.032ha) and another at Ballyconneely (0.338ha) by Ryle *et al.* (2009), giving a total estimated area of 0.054ha. However, the Doonloughan sub-site was revisited during the Sand Dunes Monitoring Project, but the habitat was not recorded (Delaney *et al*., 2013).

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

## 3.3 Range

### 3.3.1 Habitat distribution

Although little is known about the distribution of this habitat, shingle is currently thought to be widely distributed along the coastline of this site, usually in close association with related sandy habitats.

The target is that there should be no decline or change in the distribution of this habitat, unless it is the result of natural processes, including erosion and succession.

## 3.4 Structure and Functions

A fundamental aim of shingle conservation is to facilitate natural mobility. Shingle beaches are naturally dynamic systems, making them of geomorphological interest as well as ecological interest. They are constantly changing and shingle features are rarely stable in the long term.

### 3.4.1 Functionality and sediment supply

The health and on-going development of this habitat relies on a continuing supply of shingle sediment. This may occur sporadically as a response to storm events rather than continuously. Interference with the natural coastal processes, through offshore (or onshore) extraction or coastal defence structures in particular, can interrupt the supply of sediment and lead to beach starvation.

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

### 3.4.2 Vegetation structure: zonation

Ecological variation in this habitat type depends on stability; the amount of fine material accumulating between the pebbles; climatic conditions; width of the foreshore and past management of the site. The ridges and lows also influence the vegetation patterns, resulting in characteristic zonations of vegetated and bare shingle. In the frontal less stable areas of shingle, the vegetation tends to be dominated by annuals and short-lived salt-tolerant perennials. Where the shingle is more stable the vegetation becomes more perennial in nature and may include grassland, heathland and scrub, depending on the exact nature of the site. The presence of lichens indicates long term stability of the shingle structure. Transitions to intertidal, saltmarsh and sand dune habitats occur at this site.

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

### 3.4.3 Vegetation composition: typical species & sub-communities

The degree of exposure, as well as the coarseness and stability of the substrate determines species diversity. There is no available information concerning the vegetation growing on the shingle at Slyne Head but it is assumed to support a typical flora for this habitat. Typical species includes sea sandwort (*Honckenya peploides*), sea beet (*Beta vulgaris* ssp. *maritima*), rock samphire (*Crithmum maritimum*), sea mayweed (*Tripleurospermum maritimum*) and sea campion (*Silene uniflora*).

At Ballyconneely, commonly recorded species include frosted orache (*Atriplex glabriuscula*), sea sandwort (*Honckenya peploides*) and common cleavers (*Galium aparine*).

The target for this attribute is to ensure that the typical flora of vegetated shingle is maintained, as are the range of sub-communities within the different zones.

### 3.4.4 Vegetation composition: negative indicator species

Where shingle becomes more stabilised, negative indicator species can become an issue. Negative indicator species can include non-native species (e.g. *Centranthus ruber, Lupinus arboreus*); species indicative of changes in nutrient status (e.g. *Urtica dioica*) and species not considered to be typical of the habitat (e.g. *Pteridium aquilinum*).

The target for this attribute is that negative indicator species (including non-native species) should represent less than 5% of the vegetation cover.

## 4 Saltmarsh habitats

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

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

Two habitats (in bold above) are listed as Qualifying Interests for Slyne Head Peninsula SAC. The last habitat is restricted in its distribution to sites in the southeast of the country.

The SMP surveyed, mapped and assessed one sub-site within Slyne Head Peninsula SAC (McCorry & Ryle, 2009). See Appendix I for map:

1. Erriseask

Detailed descriptions of each habitat in the sub-site above as recorded by McCorry & Ryle (2009) can be found in Appendix III.

Two further saltmarsh inventory sites: Lough Athola and Ballinaboy, occur within this SAC (Curtis & Sheehy Skeffington, 1998) but were not surveyed by the SMP. All three of these sites are fringe-type saltmarshes with an underlying peat substrate.

Additional areas of potential saltmarsh habitat were identified and their areas calculated by viewing aerial photographs (McCorry & Ryle, 2009). The distribution of saltmarsh habitats within the SAC is presented in Appendix II.

The Erriseask sub-site is located in the south-east corner of Mannin Bay in a small inlet called Salt Lough. This area has a strong oceanic influence and a large area of machair and other coastal habitats has developed along the peninsula to the west of the site along the southern side of Mannin Bay. Coastal sites in this area were also surveyed by the CMP (Ryle *et al.,* 2009). The saltmarsh is situated on the east side of Salt Lough in a low-lying area. A small peninsula extending from the east side protects Salt Lough from Mannin Bay. This inlet contains inter-tidal mudflats, mixed sediment and exposed rocky shore. The peninsula is quite sandy and is dominated by dry coastal grassland with some machair. There is also some wet grassland along the landward side. The rest of the shore around Salt Lough is a complex mosaic of patches of saltmarsh exposed rocky shore, exposed rock, heath and wet grassland depending on topography. The

saltmarsh is generally fragmented and its development depends on suitable intertidal topography (McCorry & Ryle 2009).

Both qualifying interest habitats, ASM and MSM, have been recorded at Erriseask.

### 4.1 Overall Objectives

The overall objective for 'Atlantic salt meadows' in Slyne Head Peninsula SAC is to '*restore the favourable conservation condition*'.

The overall objective for 'Mediterranean salt meadows' in Slyne Head Peninsula SAC is to '*restore the favourable conservation condition*'.

This objective is based on an assessment of the current condition of each habitat under a range of attributes and targets. The assessment is divided into three main headings (a) Area (b) Range and (c) Structure and Functions.

### 4.2 Area

#### 4.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target is no decrease in extent from the baseline which was established by McCorry and Ryle (2009). Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is assessed subject to natural processes, including erosion and succession.

The total areas of each saltmarsh habitat within the SAC and the total area of the habitat within the sub-site as mapped by the SMP are presented in the following tables.

There are a number of differences in the figures below. Most of the differences can be explained by the fact that the SMP mapped the total saltmarsh resource at Slyne Head Peninsula Bay and not all of the saltmarsh mapped is contained within the SAC boundary. In addition, the total area within the SAC can be greater than given in the SMP as the SMP did not always include all mosaics when calculating their total areas. The following rules were applied when calculating the areas for the site's conservation objectives:

1. Where a polygon was identified as a mosaic of an Annex I habitat and a non-Annex I habitat, then the entire area was counted as the Annex I habitat.
2. Where a polygon was identified as a mosaic of two Annex I habitats, the area was divided 50:50 for each habitat.

Baseline habitat maps were produced for the saltmarsh in Slyne Head Peninsula during the SMP. These maps are included with the individual site report in an Appendix at the end of this document. A total of 5.99ha of saltmarsh habitat was mapped by the SMP within the SAC at the four sub-sites and an additional 4.60ha of potential saltmarsh habitat was identified using aerial photographs, to give a total estimated area of 10.59ha for the SAC.

The total area of each saltmarsh habitat within the SAC and the total area of each habitat within the site as mapped by the SMP are presented in the following tables. The target for each habitat is outlined below the relevant table.

| **Sub-site** | **Total area (ha) of ASM (excluding mosaics) from SMP** | **Total area (ha) of ASM within SAC boundary (including mosaics)** |
|---|---|---|
| Erriseask | 1.41 | 1.47 |
| **Total** | **1.41** | **1.47** |
| Potential habitat | 2.59 | 2.60 |
| **Total including potential** | **4.01** | **4.07** |

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

| **Sub-site** | **Total area (ha) of MSM (excluding mosaics) from SMP** | **Total area (ha) of MSM within SAC boundary (including mosaics)** |
|---|---|---|
| Erriseask | 4.52 | 4.52 |
| **Total** | **4.52** | **4.52** |
| Potential habitat | 2.01 | 2.01 |
| **Total including potential** | **6.53** | **6.53** |

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

### 4.3 Range

#### 4.3.1 Habitat distribution

Saltmarsh is currently known to display a wide distribution throughout the site with concentrations at Erriseask (10.59ha) and Lough Athola and Ballinaboy (Curtis & Sheehy Skeffington, 1998; McCorry & Ryle, 2009). Mediterranean salt meadows is the dominant saltmarsh habitat. The

saltmarshes are fringe type and are often found in small patches interspersed with rocky shores or sandy substrates. In places they fringe brackish lakes. Larger extents occur in places such as east of Mannin Machair. The substrate of the saltmarsh is peat, a feature confined largely to western Ireland. Both Atlantic and Mediterranean types are intermixed.

At the Erriseask subsite, erosion is not a significant issue owing to the sheltered location of Salt Lough. There is some poaching induced erosion of ASM at vulnerable locations where ASM has vegetated thin layers of substrate over rock and mixed substrates. Some of the larger saltmarsh cliffs within the MSM also show some signs of erosion that are probably related to grazing, but this is minor. A comparison of the 2nd edition 6 inch map with the OSI 2005 series aerial photos shows that there have been no significant changes along the edge of the saltmarsh during this period (McCorry & Ryle, 2009).

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

### 4.4 Structure and Functions

The location, character and dynamic behaviour of saltmarshes are governed by sediment supply, tidal regime, wind-wave climate and sea level change. The slope of the saltmarsh allows the development of several ecological gradients such as tidal submergence and salinity, and this influences the development of distinctive zones of halophytic and salt tolerant plant communities. Maintaining the favourable conservation condition of the saltmarsh habitats in Slyne Head Peninsula in terms of its structure and functions depends on a range of attributes for which targets have been set as outlined below.

#### 4.4.1 Physical structure: sediment supply

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

There are no indications of any loss of habitat due to erosion or to land-use changes within the MSM at Erriseask (McCorry & Ryle, 2009).

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

### 4.4.2 Physical structure: creeks and pans

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

At Erriseask, the MSM topography is moderately well developed with some creeks and pans present within the main area, which also has some sections with low mounds and hollows. Salt pans are quite rare. The topography of the ASM, at this site, is relatively poorly developed but this is typical of these relatively small fragments of ASM (McCorry & Ryle, 2009).

The target is to maintain creek and pan networks where they exist and to restore areas that have been altered.

### 4.4.3 Physical structure: flooding regime

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

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

### 4.4.4 Vegetation structure: zonation

Saltmarshes are naturally dynamic coastal systems. MSM is the dominant saltmarsh habitat at Slyne Head Peninsula where it occurs in a mosaic with another saltmarsh habitat ‘Atlantic salt meadows’. In order to ensure the ecological functioning of all of the saltmarsh habitats it is vital to maintain the zonations and transitions to other habitats, including intertidal, shingle and sand dune habitats.

There is some development of a transitional community along the upper MSM boundary with wet grassland where the topography allows. Some zonation within the MSM was noted by the SMP as well as some mosaics with ASM (McCorry & Ryle, 2009).

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

### 4.4.5 Vegetation structure: vegetation height

A varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds. Grazing is often used as a tool for maintaining structural diversity in the sward but stocking levels need to be appropriate. Overgrazing can lead to loss of species and destruction of the vegetation cover, while undergrazing can lead to a loss of plant diversity due to competitive exclusion.

Most of the saltmarsh at Erriseask is grazed by cattle.

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

### 4.4.6 Vegetation structure: vegetation cover

Vegetation cover can have a major effect on saltmarsh development by reducing the velocity of the tide and thereby enhancing the deposition of sediment. Excessive bare mud, however, is often a sign of overuse by livestock or humans and can lead to destabilisation and accelerated erosion of the system.

Parts of the saltmarsh at Erriseask are impacted by poaching. The more easily accessible patches along the peninsula to the north of the site are quite badly poached in places. The ASM is generally more badly damaged. Some of the MSM located in the narrow fringe of habitat along the southern side of Salt Lough is badly poached in places due to heavy grazing and winter feeding of cattle (McCorry & Ryle, 2009).

The target is to maintain 90% of the area outside of the creeks vegetated.

### 4.4.7 Vegetation composition: typical species & sub-communities

Saltmarshes contain several distinct zones that are related to elevation and frequency of flooding. The lowest part along the tidal zone is generally dominated by the most halophytic (salt-tolerant) species including common saltmarsh-grass (*Puccinellia maritima*) and species more usually associated with *Salicornia* muds. The mid-marsh zone is generally characterised by sea thrift

(*Armeria maritima*), sea plantain (*Plantago maritima*) and sea aster (*Aster tripolium*). This mid-zone vegetation generally grades into an herbaceous community in the upper marsh, dominated by red fescue (*Festuca rubra*), sea milkwort (*Glaux maritima*) and saltmarsh rush (*Juncus gerardii*).

The target for this attribute is to ensure that a typical flora of saltmarshes is maintained, as are the range of sub-communities within the different zones. Below are lists of typical species for the different saltmarsh zones, although some of these species have a restricted distribution nationally and may not occur in the Slyne Head Peninsula area.

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

Turf fucoids occur at Erriseask and are species of local distinctiveness. They are a typical feature of saltmarsh found along the western coast of Ireland.

### 4.4.8 Vegetation structure: negative indicator species

The only invasive and non-native species recorded on saltmarshes during the SMP was common cordgrass (*Spartina anglica*). This species was absent from Slyne Head Peninsula SAC during the SMP (McCorry & Ryle, 2009) and is not indicated as occurring in the Atlas Flora of Britain and Ireland (Preston *et al*., 2002).

As *Spartina* has not previously been recorded from this site, the current target is that the species should be prevented from establishing.

## 5 Sand dune habitats

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

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

- **Annual vegetation of drift lines (1210)**
- **Embryonic shifting dunes (2110)**
- **Shifting dunes along the shoreline with *Ammophila arenaria* (2120)**
- Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130) *
- Decalcified dunes with *Empetrum nigrum* (2140) *
- Decalcified dune heath (2150) *
- Dunes with *Salix repens* (2170)
- Humid dune slacks (2190)
- **Machair (21AO) ***

The four habitats indicated in bold above are listed as Qualifying Interests for Slyne Head Peninsula SAC. These habitats include mobile areas at the front, as well as more stabilised parts of dune systems.

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

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

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

Machair (21A0) is a highly specialised and complex dune habitat that is confined globally to the north-west coasts of Ireland and Scotland. It comprises a flat or gently undulating sandy plain that develops in an oceanic location with a cool moist climate. Machair systems are highly calcareous, the sediments usually containing a high percentage of shell fragments and having pH values in excess of 7. The vegetation is herbaceous, with low frequency of sand-binding species (Gaynor, 2006). Irish machair is a priority habitat under the EU Habitats Directive.

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

The CMP surveyed four sub-sites within Slyne Head Peninsula SAC:

1. Ballyconneely
2. Mannin Bay
3. Aillebrack
4. Doonloughan

As part of the Coastal Monitoring Project (CMP) detailed individual reports and habitat maps were produced for all sub-sites and those compiled for Ballyconneely and Mannin Bay are included in a set of Appendices to this document (Appendix IV and V). The updated site reports and habitat maps for Aillebrack and Doonloughan from the Sand Dunes Monitoring Project (SDM) are included in Appendix VI and VII.

The combined data from the CMP for the sub-sites at Ballyconneely and Mannin Bay, along with the data from the SDM for the sub-sites at Aillebrack and Doonloughan is presented in Appendix II.

This gives a total mapped area of 280.10ha of sand dune habitat within the Slyne Head Peninsula SAC, all of which is of qualifying interest.

Ballyconneely is situated 10km south of Clifden and is situated on the southern coast of the Slyne Head Peninsula (Ryle *et al.,* 2009).

Aillebrack is also situated on the southern shore of Slyne Head and is approximately 5km southwest of Ballyconneely village (Ryle *et al.,* 2009).

Doonloughan (also referred to as Truska) sand dunes and machair are on the northern shore of Slyne Head Penninsula. The site extends along approximately 1.8km of west and northwest-facing coastline from Doonloughan Bay in the southwest to a headland at Knock in the northeast. A small number of bays within the site are separated by low rocky headlands (Ryle *et al.,* 2009).

Mannin Bay machair (also referred to as Mannin Beg) is located in the northern part of Slyne Head Peninsula SAC. It consists of a low undulating plain with wet and dry machair, which extends for approximately 3km along the southern edge of Mannin Bay from the rocky headland of Knock southeastwards to Salt Lough (Ryle *et al.,* 2009).

### 5.1 Overall objectives

The overall objective for 'Annual vegetation of drift lines' in Slyne Head Peninsula SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Embryonic shifting dunes' in Slyne Head Peninsula SAC is to 'restore the favourable conservation condition'.

The overall objective for 'Shifting dunes along the shoreline with *Ammophila arenaria*' in Slyne Head Peninsula SAC is to 'restore the favourable conservation condition'.

The overall objective for 'Machair' in Slyne Head Peninsula SAC is to 'restore the favourable conservation condition'.

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

## 5.2 Area

### 5.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. A baseline habitat map was produced for the sand dune habitats at each sub-site in Slyne Head Peninsula SAC during the Coastal Monitoring Project (CMP) (Ryle *et al*., 2009). The maps are included with the individual site reports for Ballyconneely and Mannin Bay in the Appendices at the end of this document. The baseline habitat maps for Aillebrack and Doonloughan were reviewed and updated during the Sand Dunes Monitoring Project (SDM) (Delaney *et al*., 2013) and these updated maps are included with the individual site reports in the Appendices at the end of this document. The data from the CMP and SDM has been combined to the produce the habitat map presented in Appendix II.

Two areas of machair occur at Ballyconneely, which is located at the eastern side of the Peninsula and accounts for the smallest area of the machair habitat in this SAC. An additional area of remnant machair fields is located at the western end of the site. At Mannin Bay, the machair extends for approximately 3km along the southern edge of Mannin Bay (Ryle *et al.*, 2009).

The mobile dunes at Ballyconneely occur as a discontinuous band that is mainly confined to the south western face of the main machair plain (Ryle *et al.* 2009).

The embryonic dunes at Ballyconneely are narrow and discontinuous in nature, recorded only from the western end of the site around Bunowen Bay. The embryo dunes at Mannin bay tend to occur as a narrow band on the slopes of actively eroding sand dune or machair habitat (Ryle *et al.* 2009).

The annual strandline vegetation at Ballyconneely occurs in a narrow band at the front of the dune system (Ryle *et al*., 2009).

The total areas of each sand dune habitat within the SAC are presented in the final column of the following tables.

**1210 Annual vegetation of drift lines**

| Sub-site | Data source used | Total area within SAC boundary (ha) |
|---|---|---|
| Ballyconneely | CMP | 0.50 |
| Aillebrack | SDM | 0.28 |
| Doonloughan** | SDM | - |
| Mannin Bay | CMP | - |
| **Total** | | **0.78** |

**It should be noted that the CMP recorded 0.16ha of 1210 at Doonloughan, however, this was not recorded during the SDM

**2110 Embryonic shifting dunes**

| Sub-site | Data source used | Total area within SAC boundary (ha) |
|---|---|---|
| Ballyconneely | CMP | 0.10 |
| Aillebrack | SDM | 0.45 |
| Doonloughan | SDM | 0.61 |
| Mannin Bay | CMP | 1.36 |
| **Total** | | **2.52** |

**2120 Shifting dunes along the shoreline with *Ammophila arenaria***

| Sub-site | Data source used | Total area within SAC boundary (ha) |
|---|---|---|
| Ballyconneely | CMP | 0.15 |
| Aillebrack | SDM | - |
| Doonloughan | SDM | - |
| Mannin Bay | CMP | - |
| **Total** | | **0.15** |

**21A0* Machair**

| Sub-site | Data source used | Total area within SAC boundary (ha) |
|---|---|---|
| Ballyconneely | CMP | 15.61 |
| Aillebrack | SDM | 73.56 |
| Doonloughan | SDM | 113.27 |
| Mannin Bay | CMP | 73.85 |
| **Total** | | **276.29** |

There have been recent recorded losses of habitat at the site, however they are not assessed as a negative impact as they are likely to be due to natural events owing to the exposed nature of the coastline. The general target for this attribute in the case of each habitat is that the area should be stable, or increasing. Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is always assessed subject to natural processes, including erosion and succession.

## 5.3 Range

### 5.3.1 Habitat distribution

The distribution of sand dune habitats as mapped by Ryle *et al*. (2009) and Delaney *et al*. (2013) is presented in Appendix II.

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

## 5.4 Structure and Functions

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

### 5.4.1 Physical structure: functionality and sediment supply

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

Dunes and machair systems are naturally dynamic and require continuous supply and circulation of sand. Sediment supply is especially important in the seaward side of these systems, where the strandline communities utilise accumulations of organic matter in tidal litter, trapping sand and initiating dune formation. Many machair systems are fronted by a low ridge of embryonic dunes and/or mobile dunes. In general, the true machair plain represents the area where wind erosion has eroded the original dune system down to a level just above the water table, where the wet consistency of the sand prevents further erosion (Gaynor, 2006).

The construction of physical barriers such as sea defences can interrupt longshore drift, leading to beach starvation and increased rates of erosion. Sediment circulation and erosion also has a role to play in the more stabilised dune habitats. Cycles of erosion and stabilisation are part of a naturally functioning dune system, where the creation of new bare areas allows pioneer species and vegetation communities to develop, thus increasing biodiversity. The construction of physical barriers can interfere with the sediment circulation by cutting the dunes off from the beach resulting in fossilisation or over-stabilisation of dunes.

Erosion has been severe at Doonloughan, and the absence of any substantial foredune development, as is the case at Mannin Bay and Aillebrack, indicates that sediment depletion is now a major factor in the functioning of the coastal ecosystem (Ryle *et al*., 2009).

Sand extraction was noted as a significant negative impact at Doonloughan and was also noted at Aillebrack and Mannin Bay (Ryle *et al*., 2009).

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

### 5.4.2 Physical structure: hydrological and flooding regime

Typically the true machair plain represents the area where wind erosion has eroded a dune system to a level just above the water table, where the wet consistency of the sand prevents further erosion. In general, the degree of flatness depends on the age of the system, as well as the underlying topography, geology, outcropping of local rocks and historical management. Machair plains can be terminated on the landward side by a lake or associated marsh/fen (Gaynor, 2006). Consequently, the condition and conservation of the machair habitat can be inextricably linked to the local hydrology.

Wet machair can essentially be compared to humid dune slacks due to the periodic fluctuations and the proximity of the groundwater table to the surface throughout the year. The frequency and duration of periods of flooding or inundation determines the vegetation composition. The watertable depth has been identified as the primary determining factor in vegetation variation, followed by weak trends in calcium and sodium availability. Other contributing factors include stage of development, precipitation, distance from the sea, the grazing regime, recreational pressure, nature of the sediment, soil pH and the porosity of the sediment.

Like dune slacks, machair is highly sensitive to human influences on hydrology, either through water abstraction, drainage works or increased nutrient inputs. Water abstraction interferes with the local hydrology, potentially having serious implications for the plant and animal communities of wet machair communities.

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

### 5.4.3 Vegetation structure: zonation

The range of vegetation zones on a dune system should be maintained. Gaynor (2008) highlights the highly transitional nature of much of the vegetation; therefore, it is important that the transitional communities are also conserved, including those to the saltmarsh communities.
The target is to maintain the range of coastal habitats, including transitional zones, subject to natural processes, including erosion and succession.

### 5.4.4 Vegetation structure: bare ground

This target only applies to machair. It does not apply to the other habitats present where high levels of bare sand are a natural component of the habitat. In the fixed and slack areas some degree of instability is vital. Constant cycles of erosion and stabilisation provide the necessary conditions for the establishment of pioneer species and species that favour open conditions including invertebrates, helping to increase biodiversity. These open areas are particularly important for *Petalophyllum ralfsii*, a species listed under Annex II of the EU Habitats Directive, which occurs within damp hollows in the machair at Doonloughan.

Bare sand can be exposed from the actions of grazing animals, however, it must be borne in mind that even with a moderate grazing regime, some localised damage is to be expected, because the impact of grazing animals is not applied at the same intensity throughout the site.

At Mannin Bay the machair is tightly grazed, however some overgrazing is evident in places (Ryle *et al*., 2013).

At Ballyconneely, the machair is grazed extensively by sheep which maintain the low sward, however, the integrity of the machair is relatively intact despite the severity of the grazing regime currently in place (Ryle *et al.,* 2009).

At Doonloughan, the unenclosed machair plain is heavily grazed by livestock of which sheep are numerous along with occasional cattle and ponies. The severely overgrazed nature of the grassland is attributed to overgrazing by sheep (Crawford *et al*., 1996; Ryle *et al*., 2009; Delaney *et al*., 2013).

As a pioneer species the Annex II species petawort (*Petalophyllum ralfsii*) requires bare sand and so the target for the bare sand attribute (which is normally 5%) is set at 10%.

The target is to achieve up to 10% bare sand. This target is assessed subject to natural processes.

### 5.4.5 Vegetation structure: vegetation height

A varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds. The ecological benefits of grazing on coastal habitats including machair has been well documented (Gaynor, 2006, 2008). Moderate grazing regimes can lead to the development of a species-rich vegetation cover. The animals increase biodiversity by creating micro-habitats through their grazing, dunging and trampling activities. Grazing slows down successional processes and in some cases reverses them, helping to achieve a diverse and dynamic landscape. The effects of trampling assist in the internal movement of sand through the development of small-scale blow-outs, while dunging can eutrophicate habitats whose nutrient-poor status is crucial for the survival of certain vegetation types. Many species from plants to invertebrates, benefit immensely from the open and diverse system created by a sustainable grazing regime.

Machairs are extensively used in both Ireland and Scotland as commonage areas for grazing. All machair sites are grazed by cattle, or sheep or both. Sheep are commonly the grazing animal, but the grazing density and sheep:cattle ratio is vital in determining the quality and diversity of the machair (Angus, 1994).

Grazing occurs at all sub-sites, predominantly by sheep, along with some cattle and horses.

Cattle are grazed on the open machair commonage at Aillebrack, and the positive effects of grazing in maintaining the short turf areas are conducive to the development and continuance of species-rich habitat. A small proportion of this site was somewhat undergrazed. Approximately 20 owners share grazing rights on the machair commonage.

The machair at Ballyconneely is extensively grazed by sheep which maintains the low sward (Ryle *et al.,* 2009).

At Mannin Bay the grazing levels are impacting positively on species diversity by maintaining a short sward (Ryle *et al*., 2009).

The machair at Doonloughan is severely overgrazed by sheep while the grazing regime is considered to be beneficial to the machair at Aillebrack, although undergrazing has been noted in places (Delaney *et al.,* 2013).

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

### 5.4.6 Vegetation composition: plant health of dune grasses

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

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

### 5.4.7 Vegetation composition: typical species & sub-communities

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

The vegetation of machair is often composed of both wet and dry communities and although there is generally an obvious distinction between the dry and wet types, transitional communities are common (Gaynor, 2006). No suite of species is unique to machair and the vegetation can best be described as a mosaic of calcareous fixed dune, mesotrophic grassland and dune slack communities (Gaynor, 2006).

The following table lists the dominant species listed in dry and wet Irish machair from Gaynor (2006). Differences in the dominant species between the two types of machair plain are indicated by *.

| **Dry machair** | **Wet machair** |
|---|---|
| *Festuca rubra* | *Trifolium repens* |
| *Plantago lanceolata* | *Agrostis stolonifera* |
| *Trifolium repens* | *Calliergonella cuspidata* |
| *Lotus corniculatus* | *Festuca rubra* |
| *Bellis perennis* | *Bellis perennis* |
| *Galium verum** | *Plantago lanceolata* |
| *Carex arenaria* | *Carex arenaria* |
| *Rhytidiadelphus squarrosus** | *Potentilla anserina* |
| *Leontodon taraxacoides** | *Hydrocotyle vulgaris* |
| *Poa pratensis (subcaerulea)** | *Lotus corniculatus* |
| *Homalothecium lutescens** | *Prunella vulgaris* |

Other species typically recorded on Irish machair include common yarrow (*Achillea millefolium*), early hair grass (*Aira praecox*), common mouse-ear (*Cerastium fontanum*), smooth hawksbeard (*Crepis capillaris*), common storksbill (*Erodium cicutarium*), eyebright (*Euphrasia officinalis*), common flax (*Linum catharticum*), red bartsia (*Odontites verna*), yellow rattle (*Rhinanthus minor*), biting stonecrop (*Sedum acre*), wild thyme (*Thymus poytrichus*) and violets (*Viola* spp.) (Ryle *et al*., 2009). The calcareous nature of the substrate can be reflected by the presence of thyme-leaved sandwort (*Arenaria serpyllifolia*), crested hair grass (*Koeleria macrantha*), ox-eye daisy (*Leucanthemum vulgare*) and squinancywort (*Asperula cynanchica*).

Slyne Head Peninsula SAC supports a characteristic dune flora, details of which can be found in the site reports in Appendix IV, V, VI and VII. Notable elements of the site flora include petalwort (*Petalophyllum ralfsii)* which was recorded frequently in previous surveys from damp machair at Doonloughan making it one of the best locations in the country for this species.

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

### 5.4.8 Vegetation composition: negative indicator species

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

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

At Mannin Bay machair, negative indicator species such as creeping thistle (*Cirsium arvense*), perennial rye-grass (*Lolium perenne*), curled dock (*Rumex crispus*) and common ragwort (*Senecio jacobaea*) occur (Ryle *et al.* 2009).

At Ballyconneely machair there are no negative indicator species present. Along the transition zone from machair to outcropping rock and heath, bracken (*Pteridium aquilinum*) was recorded by the CMP.

No buckthorn (*Hippophae*) was recorded on the dunes by the CMP or the SDM.

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

### 5.4.9 Vegetation composition: bryophytes

Bryophytes are an important element of the machair flora, while hepatics (liverworts) are found in wetter areas. The most commonly recorded bryophytes are *Homalothecium lutescens*, *Syntrichia ruraliformis* and *Rytidiadelphus squarrosus* on dry machair, while *Calliergonella cuspidate* is more frequent on wet machair.

The target for this attribute therefore is that the cover of bryophytes should always be at least an occasional component of the vegetation.

## 6 References


Angus, S. (1994). The conservation importance of machair systems of the Scottish islands, with particular reference to the Outer Hebrides. In: J.M. Baxter and M.B. Usher (Eds.), *The islands of Scotland: a living marine heritage*. Edinburgh, HMSO.

Commission of the European Communities (2007). *Interpretation Manual of European Union Habitats – EUR 27.* DG Environment – Nature and Biodiversity, Brussels.

Crawford, I., Bleasdale, A., and Conaghan, J. (1996). Biomar survey of Irish Machair Sites. Unpublished report to the National Parks and Wildlife Service, Dublin.

Curtis, T.G.H. & Sheehy Skeffington, M.J. (1998). The saltmarshes of Ireland: An inventory and account of their geographical variation. *Biology and Environment: Proceedings of the Royal Irish Academy* 98B, 87-104.

Curtis, T.G.H. & McGough, H.N. (1988). *The Irish Red Data Book*. The Stationery Office, Dublin.

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

Gaynor, K. (2006). The vegetation of Irish machair. *Biology and Environment: Proceedings of the Royal Irish Academy,* Vol. 106B, No. 3, 311-321.

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

Lockhart, N., Hodgetts, N. and Holyoak, D. (2012). *Rare and threatened Bryopytes of Ireland*. National Museums Northern Ireland.

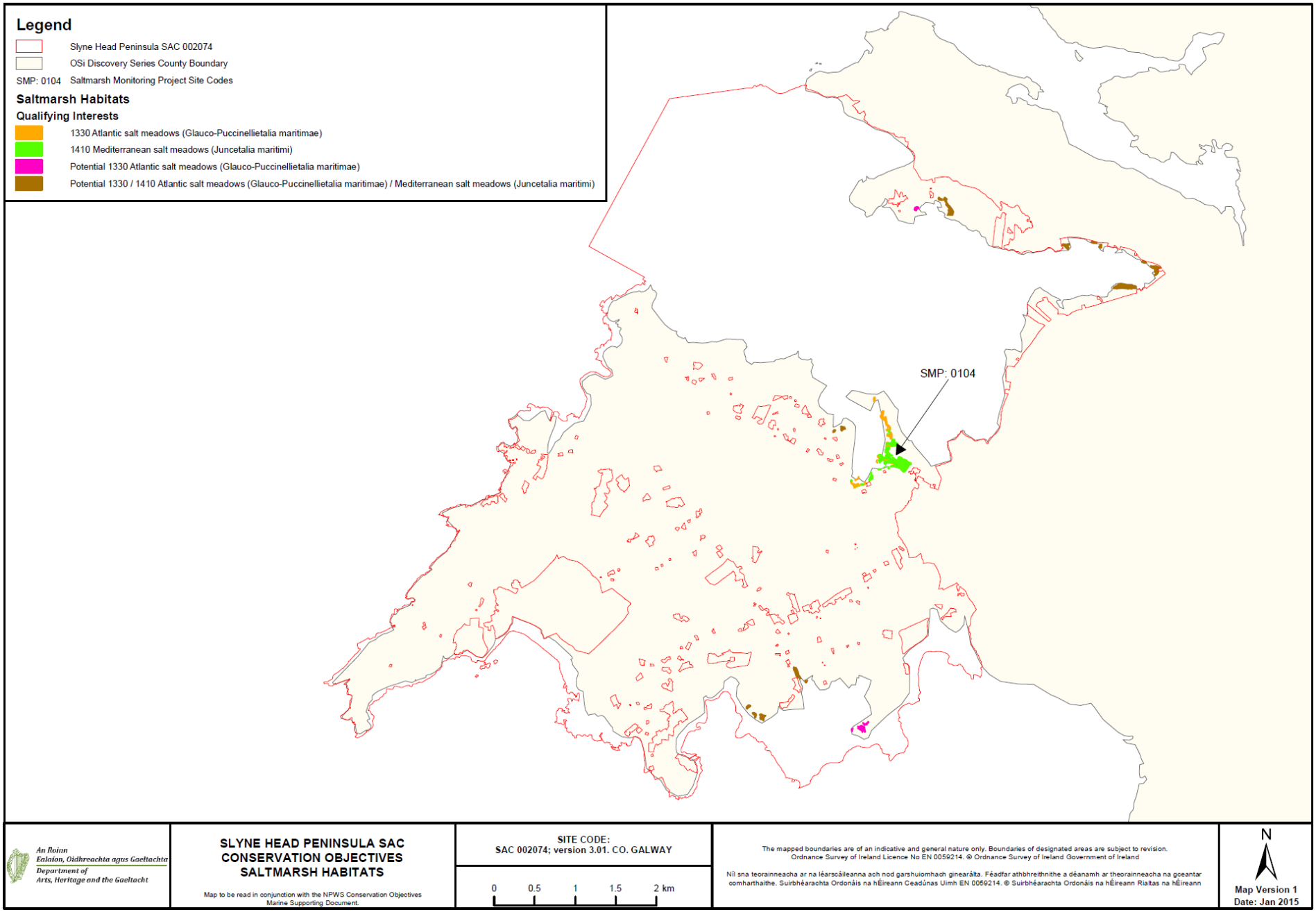
McCorry, M. & Ryle, T. (2009). *Saltmarsh Monitoring Project 2007-2008*. Unpublished report to the National Parks and Wildlife Service, Dublin.

Moore D. & Wilson, F. (1999) *National Shingle Beach Survey of Ireland 1999.* Unpublished report to NPWS, Dublin.

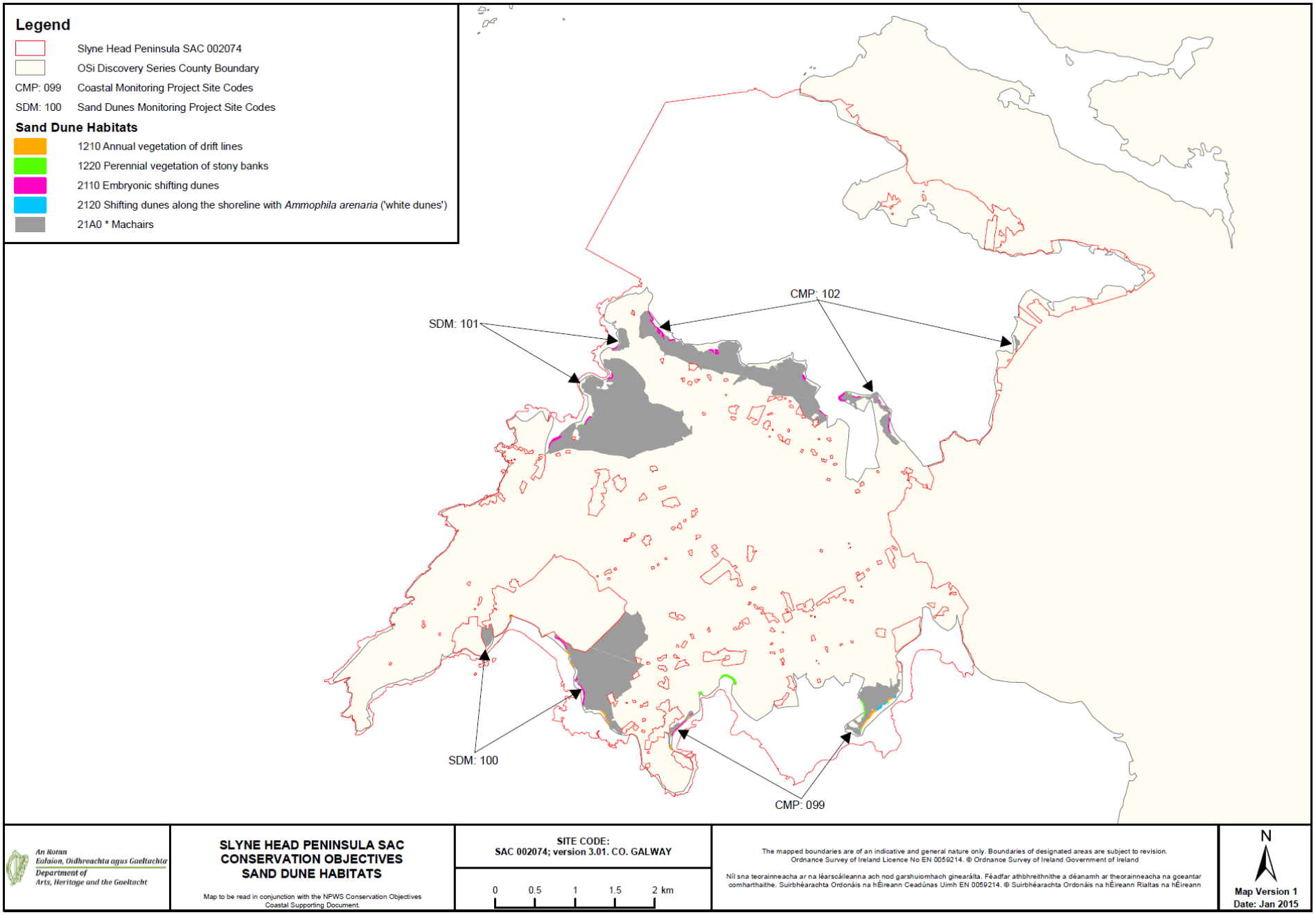
Preston, C.D., Pearman, A. and Dines, D. (2002). *New Atlas of the British and Irish Flora*. Oxford University Press.

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

# Appendix I –Distribution map of saltmarsh habitats within Slyne Head Peninsula SAC.



# Appendix II – Distribution map of sand dune habitats within Slyne Head Peninsula SAC.



# Appendix III– Erriseask site report and habitat map from the SMP (McCorry & Ryle, 2009)

## 1 SITE DETAILS

| | |
|---|---|
| SMP site name: **Erriseask** | SMP site code: **SMP0104** |
| Dates of site visit 22/04/2008 | CMP site code: **102** |
| SM inventory site name: **Erriseask** | SM inventory site code: **92** |
| NPWS Site Name: **Slyne Head Peninsula** | |
| NPWS designation cSAC: **2074** | MPSU Plan: **N/A** |
| pNHA: **2074** | SPA: **N/A** |
| County: **Galway** | Discovery Map: **44** Grid Ref: **061625, 245210** |
| Aerial photos (2000 series): **O 2930-A,B,C,D** | 6 inch Map No: **Ga 049** |
| Annex I habitats currently listed as qualifying interests for Slyne Head Peninsula cSAC: | |
| **H1330 Atlantic salt meadow (Glauco-Puccinellietalia maritimae)** | |
| **H1410 Mediterranean salt meadow (Juncetalia maritimi)** | |
| Other SMP sites within this SAC/NHA: **None** | |
| Saltmarsh type: **Fringe** | Substrate type: **Peat** |

## 2 SITE DESCRIPTION

This site is located in west Galway, 8 km south-west of Clifden Town and close to Ballyconneely. The site is located in the south-east corner of Mannin Bay in a small inlet called Salt Lough. This area has a strong oceanic influence and a large area of machair and other coastal habitats has developed along the peninsula to the west of the site along the southern side of Mannin Bay. This area was surveyed by the CMP in 2006 (Ryle *et al*. 2009). There are also some small patches of saltmarsh along this area but these were not examined during this survey. The main habitats adjacent to the coast include a mosaic of wet and dry heath, wet grassland, exposed rock, scrub, small lakes, pools and associated wetland habitats and some dry grassland. These habitats overlay a mainly low-lying undulating landscape with a complex topography of small hills, mounds and hollows. Many of the enclosures have been abandoned now but some are still grazed.

The saltmarsh habitat is mainly found on the east side of Salt Lough in a low-lying area. A small peninsula extending from the east side protects Salt Lough from Mannin Bay. This inlet contains inter-tidal mudflats, mixed sediment and exposed rocky shore. The peninsula is quite sandy and is dominated by dry coastal grassland with some machair. There is also some wet grassland along the landward side. The rest of the shore around Salt Lough is a complex mosaic of patches of saltmarsh, exposed rocky shore, exposed rock, heath and wet grassland depending on the topography. The saltmarsh is generally fragmentary and its development depends on suitable

intertidal topography. The western side of Salt lough was not surveyed as there was little saltmarsh habitat present along this side and there were access difficulties.

The site is located within the Slyne Head Peninsula candidate Special Area of Conservation (cSAC 2074). Two Annex I saltmarsh habitats are present at this site, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). Both of these habitats are listed as qualifying interests for Slyne Head Peninsula cSAC (0002074). The entire saltmarsh habitat mapped at this site is located within the SAC boundary. Lough Athola and Ballinaboy are two other SM inventory sites located in this SAC (Curtis and Sheehy-Skeffington 1998) along the northern side of Mannin Bay but these sites were not surveyed during the SMP.

Turf fucoids are the only species of local distinctiveness recorded at this site and these are typical of saltmarsh found along the western coast of Ireland.

The site was accessed via land at the south-eastern corner. A hotel has recently been constructed on land adjacent to the site and permission was sought here to enter this land.

# 3 SALTMARSH HABITATS

## 3.1 General description

Both Atlantic salt meadow (ASM) and Mediterranean salt meadow (MSM) are present at this site with MSM being the most dominant habitat (Table 3.1). The main area of saltmarsh is centred on the east side of Salt Lough. Here MSM has developed on peat on a small low-lying area between the mainland and the peninsula extending from the east side that protects Salt lough. It is drained by one main channel containing intertidal mud. This is a typical 'fringe type' saltmarsh and is dominated by MSM with some ASM appearing along the edges of the main creeks. There are tall SM cliffs along the edge of these main creeks where the peat face is exposed.

The MSM transitions to wet grassland around the landward edge of the saltmarsh, with a relatively broad transition on the northern side of the main MSM section. There is a band of transitional vegetation around the upper boundary of the MSM with a mixture of typical terrestrial species such as Purple Moor-grass (*Molinia caerulea*), Black Bog-rush (*Schoenus nigricans*), Bird's-foot (*Lotus corniculatus*) Bog Cotton (*Eriophorum* sp.), Sedge sp. (*Carex* sp.) and tussocks containing terrestrial mosses mixed with typical saltmarsh species such as Sea Rush (*Juncus maritimus*), Creeping Bent (*Agrostis stolonifera*), Autumn Hawkbit (*Leontodon autumnalis*) and Sea Milkwort (*Glaux maritima*). The dominance of Purple Moor-grass was used to map the upper MSM boundary, where it became more dominant than Sea Rush. The distribution of Sea Rush extends higher than the upper SM boundary. The transition from MSM to adjacent wet grassland is more obvious around other parts of the site due to steeper topography.

There are several other patches of saltmarsh along the peninsula that are separated from the main area by undulations in the topography, with wet grassland, heath and exposed rock appearing in the terrestrial sections. These patches of saltmarsh are more heterogeneous in structure and

composition and form a mosaic of MSM and ASM in places. There is also some typical saltmarsh zonation with ASM appearing at the seaward side of the MSM in places.

Atlantic saltmarsh is generally found towards the northern side of the site and along the narrower fringe of habitat along the southern side. The ASM is much more heterogeneous in structure and forms mosaics with MSM and rocky shore in places. ASM is also found within the MSM along the main saltmarsh channels. This ASM has developed on relic peat deposits. This is in contrast to some of the SM that has developed on thin bands of substrate of marine origin in places. This sediment is eroding in places (related to cattle poaching) and the ASM is forming mosaics with exposed rocky shore. ASM is also found on some of the sand-blown sediment that is found sandy peninsula. Some of this ASM transitions on the landward side to dry coastal grassland with affinities to machair.

There is also some development of more brackish saltmarsh in places with stands of Sea Club-rush (*Bolboschoenus maritimus*) and Common Reed (*Phragmites australis*) developing in the drainage channel flowing from the adjacent hotel. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification.

**Table 3.1.** Area of saltmarsh habitats mapped at Erriseask.

| EU Code | Habitat | Area (ha) |
|---|---|---|
| 1330 | Atlantic salt meadow (Glauco-Puccinellietalia maritimae) | 1.418 |
| 1410 | Mediterranean salt meadow (Juncetalia maritimi) | 4.517 |
| | **Total*** | **5.935** |

*note that saltmarsh habitat may continue outside the mapped area.

## 3.2 Atlantic salt meadow (H1330)

This habitat type is less prominent at this site compared to MSM. The ASM is also quite heterogeneous and this is dependant on the type of development, land-use and intensity of gracing. ASM is found along the edges of the main drainage channel and deeper peat. The ASM is also generally heavily grazed with a low sward height. This ASM contains a typical mid-marsh community dominated by Sea Plantain (*Plantago maritima*) and also containing frequent Sea Pink (*Armeria maritima*). Other species present include Red Fescue (*Festuca rubra*), Sea Aster (*Aster tripolium*), Lax-flowered Sea Lavender (*Limonium humile*), Sea Milkwort (*Glaux maritima*) and Common Scurvy-grass (*Cochlearia officinalis*). The saltmarsh plants are dwarfed due to the heavy grazing. While some of the habitat is in relatively good condition, some has suffered from heavy poaching.

This habitat has also developed on more typical substrate of a marine origin further north along the peninsula. Most of this ASM is dominated by mid marsh vegetation. Some of this habitat is very badly poached and a lower marsh community develops in places with frequent Common Saltmarsh-grass (*Puccinellia martima*) appearing. The substrate is quite marshy and this may be

related to freshwater seepage. Glasswort (*Salicornia* spp.) is also present in the vegetation but at low densities. The more heavily poached tightly grazed low-mid sward contains turf fucoids.

ASM is also present on thin bands of eroding peaty substrate and form mosaics with exposed rock and mixed substrate pebbles, shingle and mud. This ASM vegetation is generally dominated by low-mid marsh communities. There is very little development of upper ASM vegetation at this site.

The ASM topography in general is poorly developed although this is related to the relatively small size of the ASM fragments around Salt Lough. There are some pans and creeks present. The seaward boundary of some of these ASM fragments is marked by small tussocks of ASM vegetation on mud where the ASM transitions into exposed rock or mixed muddy substrate. There is no distinctive ASM cliff due to heavy poaching and there is no sign of any accretion ridges.

### 3.3 Mediterranean salt meadow (H1410)

This habitat type dominated the survey area with the largest black found east of Salt Lough and several other smaller patches appearing elsewhere on the site. The MSM contained a typical vegetation assemblage being dominated by Sea Rush with cover values between 20-75%. The largest section did display some typical zonation of saltmarsh species. The lower section nearest the main drainage channel is characterised by Sea Rush with a significant portion of Sea Plantain. Other species present include Saltmarsh Rush (*Juncus gerardii*), Sea Pink, Common Scurvy-grass, Sea Aster and Sea Milkwort. The upper section closer to the landward boundary is characterised by the dominance of grasses including Creeping Bent and Red Fescue. Other species present include Autumn Hawkbit, White Clover (*Trifolium repens*), Sea Milkwort, Sea Plantain and Common Scurvy-grass. The vegetation along the landward boundary is tussocky and characterised by the presence of Purple Moor-grass. Other more typical terrestrial species may appear on the hummocks. Purple Moor-grass may extend into the MSM habitat over some distance (< 20 m) due to the relatively flat topography in places.

The saltmarsh topography within the MSM is somewhat typical with one large main channel draining the main section. This largest area of saltmarsh has the gentlest slopes and some sections are relatively flat. Within the MSM there are some low mounds and hollows. Salt pans are quite rare. The topography of a large area in the main section is characterised by old, evenly-spaced former drainage channels that are now vegetated and resulting in a heterogeneous surface. This has also introduced some zonation of saltmarsh species within this habitat.

The small patches of MSM that appear along the narrower coastal fringe around the other sides of Salt Lough are similar in characteristics to the main section, although the topography is less well-developed.

## 4 IMPACTS AND ACTIVITIES

Several impacts and activities affect this site with a range of intensities (Table 4.1). The main impact and activity affecting this site is cattle grazing (140, 143). Most of the salt-marsh is grazed by cattle. The more-vulnerable, easily accessible patches along the peninsula to the north of the site are quite badly poached at some locations. The ASM is generally more badly damaged. However, the majority of the large area of MSM is less intensively grazed and exhibits low levels of poaching or poaching is absent. Some of the MSM located in the narrow fringe of habitat along southern side of Salt Lough and the minor road accessing this area is badly poached in places due to heavy grazing and winter feeding of cattle. There are several different management units. Several tracks created by grazing animals cross the saltmarsh habitat (501) but have minor impact. The main drainage creek is used for mooring boats but this has very little impact on the saltmarsh.

Erosion (900) is not a significant impact at this site and would not be expected as Salt lough is relatively sheltered. There is some poaching-induced erosion of some ASM at vulnerable locations were ASM has vegetated thin layers of substrate over rock and mixed substrates (about a third of total area). Some of the larger SM cliffs within the MSM also show some signs of erosion that are probably related to grazing, but this is very minor. A comparison of the OSI 2nd edition 6 inch map to the OSI 2005 series aerial photos shows that there have been no significant changes along the edge of the saltmarsh during this period.

There has recently been some construction at the Erriseask House Hotel adjacent to site (402). The coastal habitats have not been affected by land-take for the hotel and grounds. However the saltmarsh has been affected by drainage works from the hotel and some drainage channels have been cut through the saltmarsh recently (810). There may be some grey water discharge into the site from the hotel area (420). There are also some patches of recently dumped spoil along the edge of the saltmarsh that is probably related to the recent construction. These activities are likely to have a minor impact.

An examination of the aerial photos shows that some of the main area of saltmarsh was possibly drained or cultivated in the past. A series of linear drainage channels are present that connect to the main drainage creek and are largely re-vegetated. These drainage channels were noted in the field and could relate to previous land-use in the 18th-19th centuries. However, it is not known if these ridges are man-made or are naturally occurring.

Impacts and activities adjacent to the site include discontinuous urbanisation (402), dispersed habitation (403), grazing (140), recreational use of the Mannin-More machair (622, 623). These activities have little or no measurable impact on the saltmarsh habitats.

**Table 4.1.** Intensity of various activities on saltmarsh habitats at Erriseask.

| EU Habitat Code | Activity code | Intensity | Impact | Area affected (ha) | Location of activity |
|---|---|---|---|---|---|
| 1330 | 143 | A | -1 | 1.418 | Inside |
| 1330 | 501 | C | 0 | 0.001 | Inside |
| 1330 | 900 | B | -1 | 0.500 | Inside |
| | | | | | |
| 1410 | 140 | C | 0 | 4.467 | Inside |
| 1410 | 143 | B | -1 | 0.050 | Inside |
| 1410 | 501 | C | 0 | 0.005 | Inside |
| 1410 | 900 | C | 0 | 4.517 | Inside |
| | | | | | |

[1] EU codes as per Interpretation Manual.
[2] Description of activity codes are found in Appendix III, Summary Report 2007-2008.
[3] Intensity of the influence of an activity is rated as A = high, B = medium, C = low influence and D unknown.
[4] Impact is rated as –2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1= natural positive influence and +2 = strongly managed positive influence.
[5] Location of activity: Inside = activities recorded within and directly impacting the saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

# 5 CONSERVATION STATUS

## 5.1 Overall Conservation Status

The conservation status of a site is assessed on the condition of the site and on baseline information. The main source of baseline information for this site is the NHA survey, the 1995, 2000 and 2005 OSI aerial photo series. The baseline information from the NHA survey is generally limited to some descriptions of saltmarsh habitat and does not record the specific condition of the saltmarsh during the survey at this site.

The overall conservation status of this site is assessed as *unfavourable-bad* (Table 5.1). This site is a typical western saltmarsh that shows some signs of damage from grazing and poaching by cattle. However the majority of the site is in good condition relative to its overall area.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are moderate. The main area of saltmarsh is located in a small basin with some transitional vegetation present around the landward boundaries of the SM.

This site is located within the Slyne Head Peninsula cSAC. A NPWS Conservation management plan is not available for this cSAC.

**Table 5.1.** Conservation status of Annex I saltmarsh habitats at Erriseask.

| Habitat | EU Conservation Status Assessment | | | |
|---|---|---|---|---|
| | **Favourable** | **Unfavourable - Inadequate** | **Unfavourable - Bad** | **Overall EU conservation status assessment** |
| Atlantic salt meadows (1330) | Extent | | Structure and functions Future prospects | Unfavourable bad |
| Mediterranean salt meadows (1410) | Extent | Structure and functions, Future prospects | | Unfavourable inadequate |

## 5.2 Atlantic salt meadow (H1330)

### *5.2.1 Extent*

The extent of this habitat is assessed as *favourable*. There are no indications of any loss of habitat due to erosion or to land-use changes within the current monitoring period. The habitat does display signs of poaching-induced erosion at some locations but there is no evidence that a significant area of habitat has been lost during the current monitoring period.

### *5.2.2 Habitat structure and functions*

The structure and functions of this habitat are assessed as *unfavourable-bad*. Three monitoring stops were carried out in this habitat and all failed. The main reason for the failed stops was overgrazing and severe poaching damage of most of the habitat. Other attributes required for the structure and functions of this habitat reached their targets. Several typical ASM communities were recorded on this site and zonation was evident with lower and mid marsh communities present. The ASM was also quite heterogeneous, developing on different substrates in different locations.

There are also natural successional communities to terrestrial vegetation present but these are generally poorly developed due to the shoreline topography. The saltmarsh topography is relatively poorly developed but this is typical of these relatively small fragments of ASM. Turf fucoids were recorded in this habitat but these are fairly typical of fringe type saltmarshes along the west coast of Ireland.

### *5.2.3 Future prospects*

The future prospects of this habitat are assessed as *unfavourable-bad*. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. Overgrazing and poaching is the main activity affecting the ASM at this site. There are few other impacts or activities significantly affecting this habitat. There are few prospects for significant loss of habitat due to erosion in the future. The site is within a SAC so the habitat should not be affected by land-use changes such as development. A NPWS Conservation Plan is not available for this cSAC.

## 5.3 Mediterranean salt meadows (H1410)

### *5.3.1 Extent*

The extent of this habitat is assessed as *favourable*. There are no indications of any loss of habitat due to erosion or to land-use changes within the current monitoring period. There are indications of different land-use, possibly cultivation at some stage in the 18th-19th century but the area has reverted by to MSM.

### *5.3.2 Habitat structure and functions*

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Five monitoring stops were carried out in this habitat and all passed. All of the attributes required for the structure and functions of this habitat reached their targets. The main MSM area is not significantly affected by grazing and poaching which affects the ASM. However other smaller patches along the southern side of the Salt Lough were damaged by poaching and supplementary winter-feeding of cattle. No monitoring stops were carried out in the damaged areas due to the presence of livestock, but the area of the damaged sections is significant enough (> 1%) to assess the overall structure and functions as *unfavourable-inadequate* even though the overall MSM area is in good condition. There are no other impacts that are having a significant impact on this habitat although a minor section of the habitat was modified by drainage works.

The species composition was typical of this habitat. Some zonation was noted in the habitat and this was noted from other saltmarsh species. There are also some mosaics present with ASM. The topography was moderately well-developed with some creeks and pans present within the main area, which also has some sections with low mounds and hollows. There is also some development of a transitional community along the upper MSM boundary with wet grassland where the topography allows. This site is a good example of MSM habitat that has developed on a fringe type marsh.

### *5.3.3 Future prospects*

The future prospects of this habitat are assessed as *unfavourable-inadequate*. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. Overgrazing and poaching is the main activity affecting a minor part of the MSM at this site and the majority of the habitat is in good condition. There are few other impacts or activities significantly affecting this habitat.

# 6 MANAGEMENT RECOMMENDATIONS

Some lowering of overall grazing intensity is required to enhance the conservation status of the ASM at the site. However this habitat is quite vulnerable to cattle poaching relative to the other habitats so while adjacent terrestrial grassland may be in good condition, the ASM may show signs of damage. Some poaching of ASM is typical of saltmarshes that have even low level cattle-grazing. It is likely to be difficult to adapt a suitable grazing level that is beneficial for both the coastal saltmarsh habitats and the adjacent species rich coastal grassland.

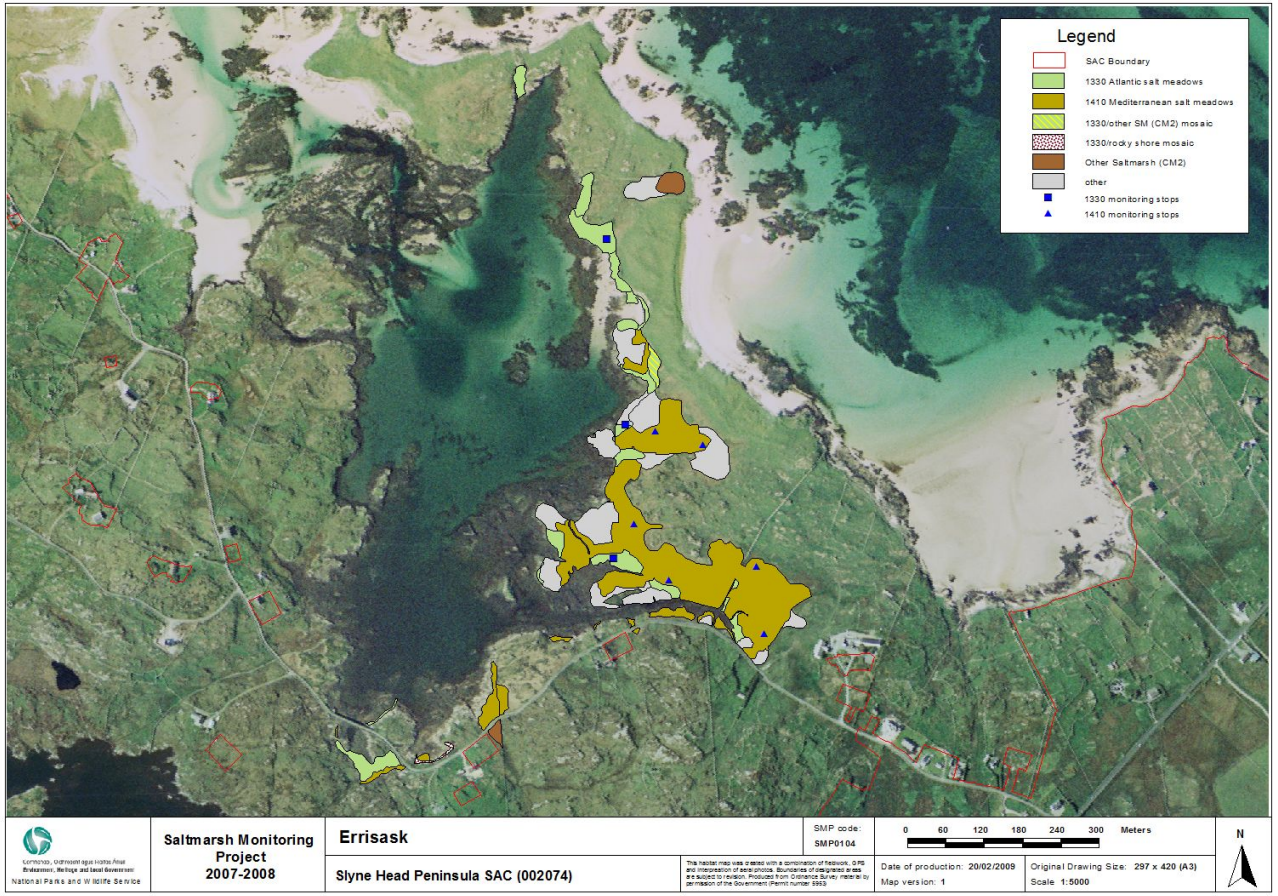
## 7 REFERENCES

Curtis, T.G.F.C. and Sheehy-Skeffington, M.J. (1998). The salt marshes of Ireland: An inventory and account of their geographical variation. *Biology and Environment: Proceedings of the Royal Irish Academy* **98B**, 87-104.

## 8 APPENDIX I

**Table 8.1.** Areas of SMP habitats mapped using GIS.

| SM Habitat code | SM habitat description | Mapped Area (ha) | Area (ha) | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1310 | 1330 | 1410 | 1420 | Spartina swards |
| 1 | 1310 *Salicornia* flats | | | | | | |
| 2 | Spartina swards | | | | | | |
| 3 | 1330 Atlantic salt meadow | 1.363 | | 1.363 | | | |
| 4 | 1410 Mediterranean salt meadow | 4.517 | | | 4.517 | | |
| 5 | ASM/MSM mosaic (50/50) | | | | | | |
| 6 | ASM/*Spartina* mosaic | | | | | | |
| 7 | 1330/other SM (CM2) mosaic | 0.080 | | 0.04 | | | |
| 8 | 1330/coastal grsld mosaic | | | | | | |
| 9 | Other (non saltmarsh) | 2.084 | | | | | |
| 10 | *Spartina* clump/mudflat mosaic (50/50) | | | | | | |
| 11 | Isolated *Spartina* clumps on mud (5%) | | | | | | |
| 12 | pioneer 1330/1310/*Spartina* mosaic | | | | | | |
| 13 | 1410/other SM (CM2) mosaic | | | | | | |
| 14 | *Spartina* sward dominated, with some ASM | | | | | | |
| 15 | 1310/*Spartina* mosaic | | | | | | |
| 16 | ASM dominated with some *Spartina* | | | | | | |
| 17 | 1330/sand dune mosaic | | | | | | |
| 18 | Other SM (CM2) | 0.173 | | | | | |
| 19 | 1330/rocky shore mosaic | 0.029 | | 0.015 | | | |
| 20 | 1420 Mediterranean scrub | | | | | | |
| 21 | 1310/1330 mosaic | | | | | | |
| | **Total** | **8.246** | | **1.418** | **4.517** | | |


Legend
SAC Boundary
1330 Atlantic salt meadows
1410 Mediterranean salt meadows
1330/other SM (CM2) mosaic
1330/rocky shore mosaic
Other Saltmarsh (CM2)
other
1330 monitoring stops
1410 monitoring stops
Saltmarsh Monitoring Project 2007-2008
Errisask
SMP code: SMP0104
Slyne Head Peninsula SAC (002074)
0 60 120 180 240 300 Meters
N
Date of production: 20/02/2009
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:5000
National Parks and Wildlife Service

## Appendix IV– Ballyconneely site report and habitat map from the CMP (Ryle *et al*., 2009)

**SITE DETAILS**

CMP06 site name: **Ballyconneely** CMP06 site code: **099** CMP Map No.: **97**

County: **Galway** Discovery map: **44** Grid Reference: **L 623430**

6 inch Map No.: **Ga 49**

Aerial photographs (2000 series): **O 2999-B & D; O 3000-A, B, C, D**

NPWS Site Name: **Slyne Head Peninsula**

NPWS designation: pNHA: **1231** cSAC: **2074**

Ranger Area: **Galway**

MPSU Plan: **None Available**

Report Author: **Tim Ryle**

**SITE DESCRIPTION**

Ballyconneely in is located approximately 10 kilometres south of Clifden in County Galway. The general area is extremely popular with tourists and its numbers swell greatly, particularly during the summer months as its many holiday homes and cottages are filled. Many come because of the beauty of the rugged Galway coastline, the extensive bog complex of Roundstone and the impressive Twelve Bens mountain range which afford some stunning scenery. The associated recreational activities are many and include a number of sandy beaches and golfcourses, such as Aillebrack, which is adjacent to Ballyconneely.

Ballyconneely is situated on the southern coast of Slyne head and is one of four sand dune sites that are situated within Slyne Head Special Area of Conservation (cSAC 1231). This large composite site has been designated for its Annex I habitats including Machair and Annex II Species such as *Petalophyllum ralfsii* (Petalwort) and *Najas inflexilis* (Slender naiad).

Some of the lakes to the landward side of Ballyconneely have been the focus of recent continuing scientific research as they have been classified as lagoons. It has been reported that some of the lakes are species-rich (Healy *et al*., 1997).

Table 99A lists the areas of each sand dune habitat recorded during the survey of Ballyconneely in 2006. The greatest portion of the site is located on the eastern half of the site, with a small narrow remnant machair/dune system recorded from the western half of the site. It should be noted that that it was not possible to survey the coastal grassland in the private property around Doon Hill, nor was it possible to approach the area when the tides are out as well maintained fences act as serious deterrents to trespassers.

Other habitats that are found in close proximity to the machair system include saltmarsh, and a variety of grassland types including agricultural and amenity grasslands, most of which occur on wet, sometimes waterlogged soils or are poorly managed, a reflection possibly of the uneconomic size of some of these fields.

Table 99A **Areas of EU Annex I habitats mapped at Ballyconneely**

| ***EU Code*** | ***EU Habitat*** | Area (ha) |
|---|---|---|
| H1210 | Annual vegetation of driftlines | 0.500 |
| H1220 | Perennial vegetation of stony banks | 0.338 |
| H2110 | Embryonic shifting dunes | 0.096 |
| H2120 | Shifting dunes along the shoreline with *Ammophila arenaria* | 0.152 |
| H21A0 | Machair | 15.833 |
| | ***8.1.1 Total Sand dune*** | **16.919** |

**Machair (H21A0)**

By far the largest portion of the sand dune system is machair grassland (15.833 ha), although relative to the 3 remaining sites in the cSAC (Aillebrack, Doonloughan and Mannin Bay, this is a relatively small area of intact machair. The machair is largely confined to a plain at the eastern half of the site, with a number of smaller remnant agricultural fields at the western end near the Pier (Bunowen Bay).

Species diversity was relatively high with many species repeatedly recorded including *Festuca rubra* (Red fescue), *Thymus polytrichus* (Thyme), *Cerastium fontanum* (Common mouse-ears), *Galium verum* (Lady's bedstraw), *Linum catharticum* (Fairy flax), *Plantago lanceolata* (Ribwort plantain) and *Achillea millefolium* (Yarrow). Bryophytes are a frequent component, often occupying between 60-90% ground cover. Common species include *Rhytidiadelphus squarrosus, Pleurozium schreberi* and *Homalothecium* spp. *Ammophila arenaria* (Marram) occurs sporadically along the seaward half of the machair,

and in one unfenced location (Monitoring Stop 3), The large patch of Marram accounts for 60-70% of the area. Other species particularly common in the transition zone with the saltmarsh include *Plantago coronopus* (Buck's-horn plantain) and *Prunella vulgaris* (Selfheal), whilst *Juncus effusus* (Soft rush) and *Iris pseudacorus* (Yellow flag) are prominent in wetter areas. Another species of interest was *Spiranthes spiralis* (Autumn lady's-tresses), which was quite common throughout drier areas of the sward.

The machair plain occurs on sand of varying depths which lies of shallow outcropping acidic rocks which start to slope uphill further inland. The sward was mostly low growing; maintained by large numbers of sheep that are kept on the machair along with horses, occasionally. Notwithstanding the sheep population, the machair grassland is in relatively good condition, with little evidence of negative indicator species.

There is a transition from the machair to outcropping rock and heath. The fern, *Pteridium aquilinum* (Bracken) often occurs following the contours of the outcropping rock.

#### Mobile Dunes (H2120)

It would appear that the supply of fresh sediment into Ballyconneely Bay is not exhaustive, or is at least prevented from setting out due to the nature of the tides. Accumulating sand is found only in a small number of sheltered areas at Ballyconneely. Much of the mobile dune habitat is due to localised reworking of the sediment some of which extends into a small number of breaks in the machair plain at its south western edge.

The greatest expanse is located along the front of the main machair plain, and is dominated almost entirely by fresh, healthy *Ammophila arenaria* (Marram). Smaller patches are found on the beach fronting a narrow band of machair grassland that runs in front of the road running around the each towards the pier.

#### Embryonic Dunes (H1220)

Embryonic dunes are not extensive at Ballyconneely, a reflection of the harsh tidal conditions that the coastline is exposed to. An area totalling less than 0.1ha was recorded (Table 99C) and this was concentrated around the small disturbed remnant of the machair system at Bunowen Bay at the western end of the site. The embryonic dunes are

characterised by *Elytrigia juncea* (Sand couch). The vegetation was often so narrow, that strandline and machair species were commonly observed within the foredunes. Species included *Honckenya peploides* (Sea sandwort), *Ammophila arenaria* (Marram) and *Carex arenaria* (Sand sedge).

**Shingle Vegetation (H1220)**

Despite the nature of the coastline and appreciable amounts of storm-borne pebble that were noted, vegetated shingle at Ballyconneely does not occur in any appreciable amounts (0.388ha). Much of the pebble/cobble fronts the eroding indented face of machair/saltmarsh. Doubtless there is considerable redistribution of the substrate, which does not favour the prolonged existence of the perennial vegetation. Commonly recorded are *Atriplex glabriuscula* (Frosted orache), *Honckenya peploides* (Sea sandwort) and *Galium aparine* (Cleavers). Another typical species of the habitat *Tripleurospermum maritimum* (Sea mayweed) was not common throughout the habitat.

**Annual Strandline (H1210)**

Similar to the perennial vegetation, the annual strandline occurs in a narrow band at the front of the dune system. However, it is discontinuous in its distribution and was recorded from only two areas. It partially replaced shingle vegetation where a localised build-up of sand had occurred on the mainly shingle beach. Typical species include *Honckenya peploides* (Sea sandwort), *Cakile maritima* (Sea rocket) and a number of *Atriplex* spp. (Orache).

**IMPACTS**

The activities and impacts that were recorded for Ballyconneely are listed in Table 99B. The machair is extensively grazed by sheep (code 142), which maintains the low sward. Despite the numbers of sheep, negative indicator species are not a noticeable feature of the sandy grassland.

Natural erosion (code 900) is an obvious feature of the rugged coastline, although given the nature of the coastline, it is not possible to quantify if there has been any significant loss of sand-dune habitat.

**Table 99B** Intensity and impact of various activities on sand dune habitats at Ballyconneely

| *EU Habitat Code*[1] | Activity Code[2] | Intensity[3] | Impact[4] | *Area affected/ha* | Location of Activity[5] |
|---|---|---|---|---|---|
| 21AO | 142 | A | 0 | 13 | Inside |
| 21BB | 302 | C | -1 | Unknown | Inside |
| 21AO | 403 | C | -1 | 0.445 | Inside |
| 21BB | 790 | C | 0 | 0.25 | Inside |
| 21AO | 900 | B | 0 | Unknown | Inside |

[1]EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.
[2] Description of activity codes are found in Appendix 3
[3] Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.
[4] Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence
[5] Location of activity: Inside = activities recorded within and directly impacting the sand dune habitat. Outside = activities recorded outside but adjacent to sand dune habitat that are impacting the sand dune habitat

Tidal litter was conspicuous with lobster pot floats numbering in the low hundreds washed up around the site (code 790). Social littering however was not a feature at the site, as the majority of the site is not readily accessible to the general public. Recreational pressures were all but absent and the only accessible beach is at the western end of the sift around the pier (Bunowen Bay) and the machair has all but been agriculturally modified or built upon.

Code 403 refers to dispersed habitation. A recently constructed house and garden was noted at the eastern end of the site. Much of the land is wet and lies over granite, however, sand was a component of the garden soil and thus represents a loss of habitat.

## 9 CONSERVATION STATUS

Ballyconneely is one of four coastal sites from Slyne Head candidate Special Area of Conservation. As such the information regarding the individual sand dune systems is all-inclusive and is only comparable in the broadest terms. In addition, previous studies do not identify Ballyconneely as a machair system and it may be that it is amalgamated into the more extensive site at Aillebrack (CMP site 100). The conservation status (Table 99C) of this site primarily based on predetermined monitoring stops which enable structure and function of a habitat to be assessed, while future prospects are based on the survey work as well as any other information that has been gathered about the site.

### Machair (H21A0)

The extent of machair is rated as favourable at Ballyconneely and is rated as *favourable* (Table 99C). Two areas of machair occur. The largest area at the eastern end of the site

accounts for the greatest area of the machair system. A second smaller area of remnant machair fields is located at the western end of the site at Bunowen Bay.

The Structure and Functions are rated as *favourable* as all four monitoring stops passed on (Table 99D). However, it should be noted that the remnant machair fields at the western end of the site was highly disturbed and would have a far greater proportion of negative indicator species.

The majority of the machair plain is relatively intact despite the severity of the grazing regime currently in place. Its future prospects are rated as *favourable* (Table 99C).

Overall, the conservation status of the machair is rated *favourable*, whilst the Irish rating is *maintained* (Table 99C).

**TABLE 99C** CONSERVATION STATUS OF ANNEX I SAND DUNE HABITATS AT BALLYCONNEELY

| **HABITAT**[1] | **EU Conservation Status Assessment** | | | | |
|---|---|---|---|---|---|
| | **FAVOURABLE** | **Unfavourable - Inadequate** | **Unfavourable - Bad** | **Overall EU conservation status assessment** | **Proposed Irish conservation status system**[2] |
| **MACHAIR (H21A0)** | Extent/ Structure & Functions/ Future Prospects | | | **Favourable** | **Favourable - Maintained** |
| **MOBILE DUNES (H2120)** | Structure & Functions / Future Prospects | Extent | | **Unfavourable - Inadequate** | **Unfavourable - Unchanged** |
| **PERENNIAL VEGETATION (H1220)** | Structure & Functions | | | **Favourable** | **Favourable - Maintained** |
| **ANNUAL STRANDLINE (H2120)** | Structure & Functions | | | **Favourable** | **Favourable - Maintained** |

[1]EU Codes as per Interpretation Manual

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

**Mobile Dunes (H2120)**

Mobile dunes occurred as a discontinuous habitat, much of it confined to the south-western face of the main machair plain. They are rated as *unfavourable-inadequate* for extent (Table 99C).

Owing to the extremely limited area of the mobile dunes monitoring stops were not carried out. However the structure and functions are rated as *favourable* (Table 99C) owing to the floristic assemblage and the localised concentration of shifting sand.

The future prospects are rated as *favourable* (Table 99C). It would appear that unconsolidated sand is locally available, particularly where the intensively grazed machair sward is locally undermined through wind erosion.

The overall conservation status assessment for the limited mobile dune habitat is *favourable*. The Irish conservation status is tentatively rated as *favourable-maintained* (Table 99C).

**TABLE 99D** PASS/FAIL RESULTS OF MONITORING STOPS FOR ANNEX I SAND DUNE HABITATS AT BALLYCONNEELY

| | **Monitoring stops** | | |
|---|---|---|---|
| **HABITAT** | **Pass** | **Fail** | **Conservation status** |
| MACHAIR (H21A0) | 4 | 0 | Favourable |

**Embryonic Dunes (H2110)**

Narrow and discontinuous in nature, this highly disturbed fore dune vegetation is only recorded from the western end of the site around Bunowen Bay. Therefore no conservation assessment is made for the habitat.

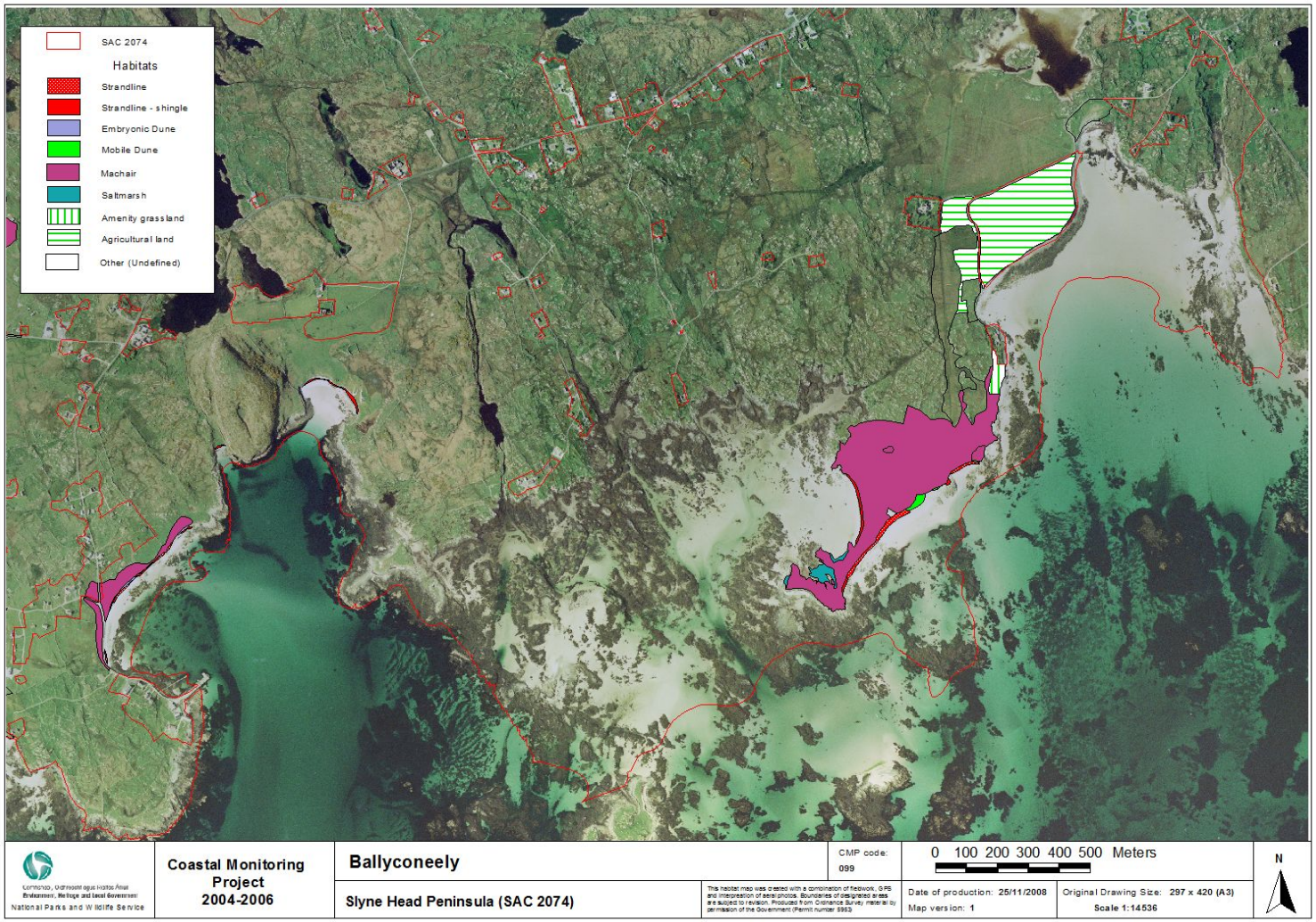
**Annual Strandline & Perennial Shingle (H1210 & H1220)**

The vegetated strandline habitats are jointly assessed, based on best scientific judgement owing to the limited distribution of these habitats and the intricate nature of their co-distribution. Both are rated as favourable for extent given the nature of the tidal conditions.

The structure and functions are *favourable* as the species assemblage for both strandline communities was typical of the community (Table 99C).

In the absence of detailed information as to their previous extent or distribution, the future prospects are rated as *favourable* (Table 99C).

Overall, the conservation assessment for both strandline communities is *favourable* as the three assessment criteria were all rated *favourable* (Table 99C). Under the proposed Irish conservation assessment scheme, this is analogous *to favourable-maintained*.


SAC 2074
Habitats
Strandline
Strandline - shingle
Embryonic Dune
Mobile Dune
Machair
Saltmarsh
Amenity grassland
Agricultural land
Other (Undefined)
Coastal Monitoring Project 2004-2006
Ballyconeely
Slyne Head Peninsula (SAC 2074)
CMP code: 099
0 100 200 300 400 500 Meters
N
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:14536
National Parks and Wildlife Service

## Appendix V– Mannin bay site report and habitat map from the CMP (Ryle *et al*., 2009)

**SITE DETAILS**

CMP06 site name: **Mannin Bay** CMP06 site code: **102** CMP Map No.: **100**

County: **Galway** Discovery map: **44** Grid Reference: **L 622 454**

6 inch Map No.: **Ga 034, 035, 048 & 049**

Aerial photographs (2000 series): **O2929 A,B,C & D; O2930 A,B,C & D**

NPWS Site Name: **Slyne Head Peninsula**

NPWS designation: pNHA: **2074** cSAC: **2074**

Ranger Area: **Galway**

MPSU Plan: **None**

Report Author**: Anne Murray**

**SITE DESCRIPTION**

Mannin Bay machair site occurs within the cSAC of Slyne Head Peninsula. The peninsula lies west of Ballyconneely in County Galway. The peninsula is fringed with rocky shores and sandy beaches, with some extensive areas of machair and several brackish lakes and lagoons. Inland, the site is a maze of small fields, supporting a mosaic of habitats dominated by grassland and heath, interspersed with numerous lakes and associated swamp, marsh and fen. An important feature of the site is the influence of windblown sand on these habitats.

The cSAC is designated for the EU Annex I sand dune habitats, Machair (priority habitat), Mobile dunes and Annual vegetation of driftlines. It is listed for fifteen other Annex I habitats including the priority habitats Lagoons and Orchid-rich grasslands. Three other machair sites occur within the cSAC and are dealt with separately within this project. These are Ballyconneely (CMP site 99), Aillebrack (CMP site 100) and Doonloughan – Truska (CMP site 101).

The cSAC is also selected for two rare and legally protected species, listed in Anne II of the EU Habitats Directive - *Najas inflexilis* (Slender naiad) and *Petalophyllum ralfsii*

(Petalwort). The latter has been recorded on the machair in Mannin Bay and also at the other sites of the cSAC - Doonlughan and Aillebrack.

Mannin Bay machair is located in the northern part of the cSAC. It comprises a low undulating plain with wet and dry machair grassland, extending for approximately 3km along the southern edge of Mannin Bay from the rocky headland of Knock southeastwards to Salt Lough. Landward, the machair extends upslope for a short distance over a rock ridge that runs parallel to the coastline. A small fen/marsh lies at the base of the ridge towards the centre of the site. The machair is delineated for the most part by a road, beyond which, there are fields with a mosaic of rocky outcrops, heath, dry grassland, wet grassland and marsh. The seaward edge of the machair is fringed by rock, saltmarsh and a thin band of embryonic dunes in parts. The total sand dune area at Mannin Bay is 75.237 with machair comprising the greatest part of this area (98% of the total).

**Machair (H21A0)**

This area of machair was rated as *good* (Grade II) by Bassett (1983) as the site was considered unique in terms of its pedology. Some of the highest levels of calcium carbonate recorded for Irish machair were found in the soils at Mannin Bay. A very large proportion of the soil is made up of shell fragments with a low organic content (5%) and high pH levels (8.0). The total machair area comprises 73.906ha at Mannin Bay.

The machair species recorded at Mannin Bay include**:** *Anthyllis vulneraria* (Kidney vetch), *Achillea millifolium* (Yarrow), *Bellis perennis* (Daisy), *Carex arenaria* (Sand sedge), *Cerastium fontanum* (Common mouse-ear), *Euphrasia officinalis* agg. (Eyebright), *Galium verum* (Lady's bedstraw), *Linum catharticum* (Fairy flax), *Lotus corniculatus* (Common bird's-foot-trefoil), *Plantago lanceolata* (Ribwort plantain), *Prunella vulgaris* (Selfheal), *Rhinanthus minor* (Yellow-rattle), *Trifolium repens* (White clover) and *Thymus polytrichus* (Wild Thyme).

**Table 102A** Areas of EU Annex I habitats mapped at Mannin Bay

| EU Code | EU Habitat | Area (ha) |
|---|---|---|
| H2110 | Embryonic shifting dunes | 1.331 |
| H21A0 | Machair | 73.906 |
| | **Total Sand dune** | **75.237** |

Other species present include: *Asperula cynanchica* (Squinancywort), *Festuca rubra* (Red fescue), *Hypochaeris radicata* (Cat's ear), *Leontodon saxatilis* (Lesser Hawkbit), *Luzula campestris* (Field wood-rush), *Spiranthes spiralis* (Autumn lady's-tresses), *Taraxacum* agg. (Dandelion) and mosses- *Aulocomium* spp., *Homalothecium lutescens*, *Rhytidiadelphus squarrosus* and *Tortula ruraliformis*.

In the wetter parts of the machair, which occur in hollows, the species present include *Agrostis stolonifera* (Creeping bent), *Carex arenaria* (Sand sedge), *Carex flacca* (Glaucous sedge), *Carex nigra* (Common sedge), *Glaux maritima* (Sea-milkwort), *Hydrocotyle vulgaris* (Marsh pennywort), *Juncus acutiflorus* (Sharp-flowered rush) and *Mentha aquatica* (Water mint).

The rare liverwort *Petalophyllum ralfsii* (Petalwort) was recorded on the machair north of Mannin More, by D.T.Holyoak (2004). The liverwort was searched for during this survey but without success. A monitoring stop was placed in the area of machair where the liverwort was previously recorded. The area is very tightly grazed but the monitoring stop passed all attributes. The presence of a bare sand track indicated some disturbance in the general area, which would be favourable for the liverwort.

Most of the machair plain is unenclosed and grazed by sheep and cattle. Part of the machair at Mannin More is fenced into fields and agriculturally improved. The negative indicator species were recorded in these fields and include *Cirsium arvense* (Creeping thistle), *Lolium perenne* (Perennial rye-grass), *Rumex crispus* (Curled dock) and *Senecio jacobaea* (Common ragwort).

The site is reasonably accessible, although parking is very restricted to the narrow access road. There is some recreational activity evidenced by the presence of a few caravans on the site and large tracks through the machair. There is also a football pitch on the machair, however this has not modified the machair greatly and a good diversity of typical species remains.

**Embryonic Dunes (H2110)**

The total area of embryonic dunes is 1.331ha (Table 102A). The machair at Mannin Bay is edged mainly by rock interspersed with saltmarsh and narrow bands of bare sand colonised by embryonic dune species. The typical embryonic species *Elytigia juncea* (Sand couch) dominates along with *Carex arenaria* (Sand sedge). Other species common in this habitat are, *Sedum acre* (Biting stonecrop), *Erodium cicutarium* (Common stork's-bill) and *Plantago coronopus* (Buck's-horn plantain).

No negative indicator species were recorded in this habitat during the survey.

## IMPACTS

The activities impacting the machair and sand dunes at Mannin Bay are given in Table 102B. This site is impacted mainly natural erosion and grazing. The machair is tightly grazed (code 140) and this is impacting positively on this habitat. However, some overgrazing (code 142) is evident in places and may become a problem in the future for this habitat.. A small part of the machair at Mannin More is fenced into individual fields (code 150), one of the fields is improved (code 103) and contains agricultural weeds (code 954). Sand extraction (code 300) has been recorded in Mannin Bay in the past but appears to be halted at present and is currently not considered a threat.

**Table 102B** Intensity and impact of various activities on sand dune habitats at Mannin Bay

| EU Habitat Code[1] | Activity Code[2] | Intensity[3] | Impact[4] | Area affected/ha | Location of Activity[5] |
|---|---|---|---|---|---|
| H21A0 | 103 | C | -1 | 2 | Inside |
| H21A0 | 140 | A | -1 | 45 | Inside |
| H21A0 | 142 | C | -1 | 2 | Inside |
| H21A0 | 150 | B | -1 | 2 | Inside |
| H21A0 | 607 | B | -1 | 1 | Inside |
| H21A0 | 608 | B | -1 | 5 | Inside |
| H21A0 | 622 | B | -1 | 60 | Inside |
| H21A0 | 623 | A | -1 | 10 | Inside |
| H21A0 | 720 | A | -1 | 20 | Inside |
| H21A0 | 900 | A | 0 | Unknown | Inside |
| H2110 | 900 | A | 0 | Unknown | Inside |
| H21A0 | 954 | C | -1 | 2 | Inside |

[1] EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.
[2] Description of activity codes are found in Appendix 3
[3] Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.
[4] Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence
[5] Location of activity: Inside = activities recorded within and directly impacting the cSAC. Outside = activities recorded outside but adjacent to sand dune habitat that are impacting the cSAC

A sports pitch (code 607) is located on the machair at Mannin More, however the structure of the machair has not been altered and the area still contains a high diversity of typical species.

Access to the site is relatively easy as a road runs parallel to the machair with tracks off the road towards the beach, a large hotel is located on the eastern edge of the site. Recreational activities (mainly during the summer months) such as, trampling (code 720) from walkers (code 622) are affecting the machair. There are a number of tracks, radiating from the main access points across the machair, created by visitors and vehicles (code 623). Some informal caravanning and camping (code 608) occurs on the central part of the machair at Mannin Bay.

Natural erosion (code 900) is affecting both the machair and the small bands of embryonic that occur along the machair edge.

**CONSERVATION STATUS**

The conservation status of a site is assessed on the condition of the site and on baseline information. The main source of baseline information for this site is the ASI survey, the machair survey by Bassett (1983), NATURA 2000 survey and Biomar Survey of Irish Machair Sites (Crawford *et al*., 1996).

The method of assessment of conservation status differed in the NATURA 2000 survey and so direct comparisons between the conservation status of the two surveys were not possible. In relation to machair habitat, comparisons can be made with the Biomar machair survey 1996 mainly in relation to structure and functions of machair and its condition. There is no delineation of machair in the 1996 Machair study as the NVC habitat classification was used to describe the machair system. As machair is not defined by a particular plant community it was not possible to discern the boundaries between machair and other sand dune plant communities from the 1996 maps. Therefore, best scientific judgement is used along with any of the broader comparisons made with previous surveys. The conservation status of the Annex I machair and sand dune habitats at Mannin Bay are given in Table 102C.

**Machair (21A0)**

The extent of machair is rated as *favourable* (Table 102C). The loss of machair at Mannin Bay is from natural erosion. This is not considered unfavourable impact. There are some tracks evident in the machair from visitors and vehicles. Although a small amount of bare ground is considered good for the overall functioning of the machair, if this is not managed it may exacerbate natural erosion.

Twelve monitoring stops were placed in the machair during this survey and all of these passed (Table 102D). However, a small part of the machair is fenced off into fields at Mannin More. These fields have been improved and contain a high cover of negative indicator species. Ring feeders are present and large areas of bare ground caused by trampling by livestock are evident. It is also possible that sand extraction may have occurred in these fields, in the past. Access problems prohibited the placement of stops in these fields, however the stops would have failed. Therefore, the structure and functions parameter of the machair is rated as *unfavourable-inadequate.*

**Table 102C** Conservation status of Annex I sand dune habitats at Mannin Bay

| **Habitat**[1] | **EU Conservation Status Assessment** | | | **Overall EU conservation status assessment** | **Proposed Irish conservation status system**[2] |
|---|---|---|---|---|---|
| | **Favourable** | **Unfavourable - Inadequate** | **Unfavourable - Bad** | | |
| **Machair (H21A0)** | Extent | Structure & Functions/ Future Prospects | | **Unfavourable-inadequate** | **Unfavourable-unchanged** |
| **Embryonic Dunes (H2110)** | Extent/ Structure & Functions/ Future Prospects | | | **Favourable** | **Favourable-maintained** |

[1]EU Codes as per Interpretation Manual
[2] Ratings are Favourable (Enhanced, Maintained, Recovered, Declining), Unfavourable (Recovering, Unchanged, Declining) and Destroyed (Partially destroyed, Completely destroyed and Unknown)

**Table 102D** Pass/Fail results of monitoring stops for Annex I sand dune habitats at Mannin Bay

| | **Monitoring stops** | | |
|---|---|---|---|
| **Habitat** | **Pass** | **Fail** | **Conservation status** |
| **Machair (H21A0)** | 12 | 0 | **Unfavourable-inadequate*** |

***This rating is attributable to the fenced machair (see text)

The future prospects of this habitat are considered *unfavourable-inadequate.* The Conservation Plan for this site has yet to be completed and so there is currently no conservation management strategies devised for the site. The sward is very tight and small areas are overgrazed, it is not certain that the current grazing regime is appropriate for the longterm viability of the machair. It is also likely, that the site and the machair will come under increasing recreational pressures with the recent development of the hotel adjacent to the machair.

The conservation status of the machair within the entire cSAC is described as good *conservation* in the NATURA 2000 survey. Currently, the overall EU conservation status of the machair is considered *unfavourable-inadequate* (Table 102C).

The Irish conservation status is rated as *unfavourable-unchanged*.

**Embryonic Dunes (H2110)**

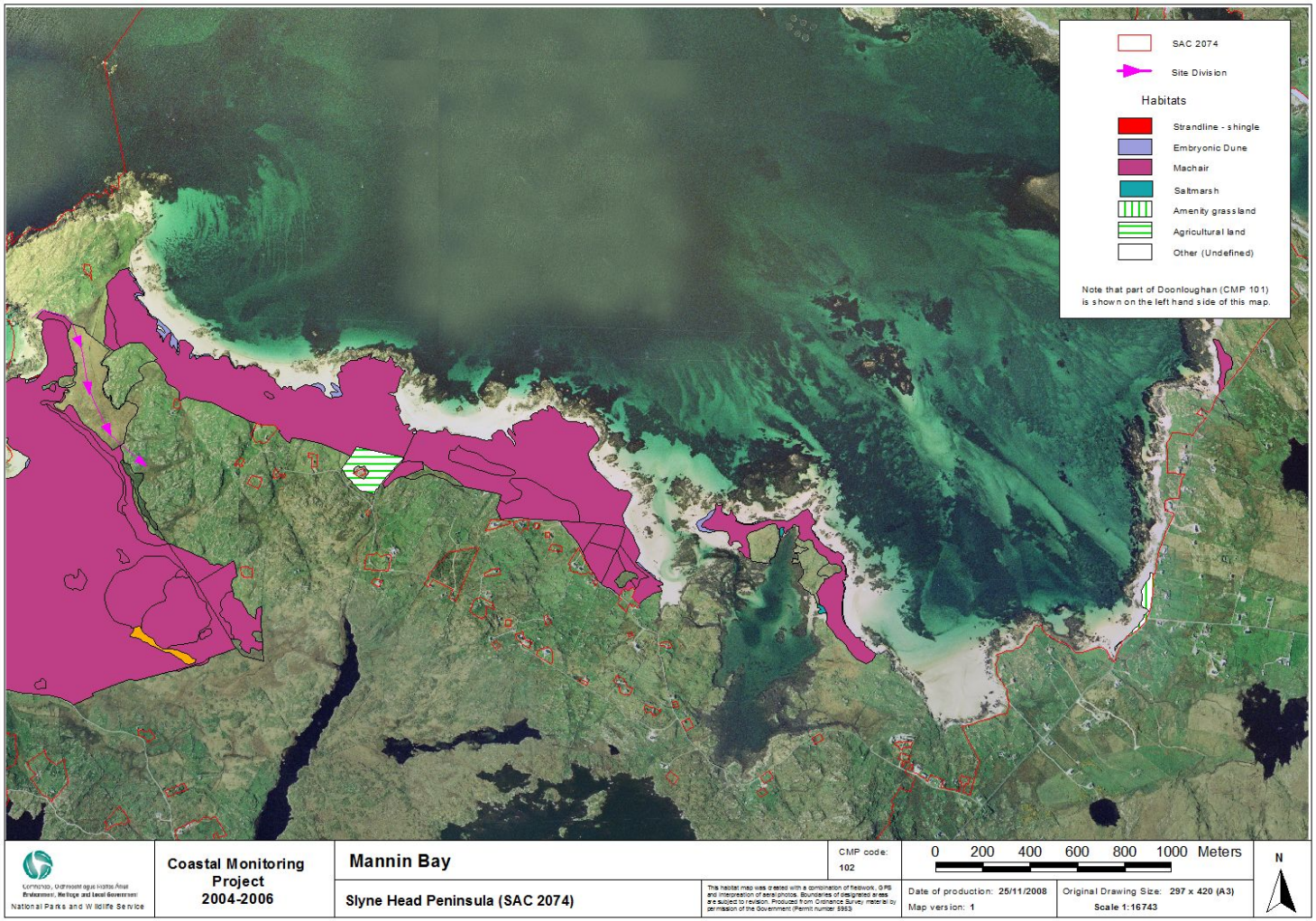
Even though the extent of embryonic dunes is very narrow, it is rated as *favourable* at Mannin Bay (Table 102C). Given the more exposed nature of the west coast to Atlantic Ocean, the embryonic habitat on the west/northwest coast of Ireland differs from the wider more accreting embryonic zones of the east coast. The embryonic dunes tend to occur as a narrow band on the slopes of actively eroding sand dune or machair habitat. These are undergoing natural erosion at Mannin Bay, a process that is not considered unfavourable in relation to extent of habitat.

The structure and functions parameter is rated as *favourable*. No monitoring stops were placed in the embryonic zone given the limited area of the habitat. However, it is noted that the area contained the typical species – *Elyrigia juncea* (Sand couch) and that the habitat is relatively intact. Negative indicator species were not present.

The future prospects of this habitat are considered *favourable*. It is likely that the current natural erosion will continue and this is not considered unfavourable. There are no obvious threats to the embryonic zone. If grazing in reduced on the machair, it is likely that this will also impact positively on the embryonic dunes.

The conservation status of the embryonic dunes at Mannin Bay is rated as *good conservation* in the NATURA 2000 survey. Currently, the overall EU conservation status of embryonic dunes is *favourable* (Table 102C). This rating is attributable to the absence of any major threats to the habitat except natural coastal erosion.

The Irish conservation status is rated as *favourable- maintained*.


SAC 2074
Site Division
Habitats
Strandline - shingle
Embryonic Dune
Machair
Saltmarsh
Amenity grassland
Agricultural land
Other (Undefined)
Note that part of Doonloughan (CMP 101) is shown on the left hand side of this map.
Coastal Monitoring Project 2004-2006
Mannin Bay
CMP code: 102
Slyne Head Peninsula (SAC 2074)
This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated areas are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 5953)
0 200 400 600 800 1000 Meters
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:16743
N
National Parks and Wildlife Service

**APPENDIX VI: SITE REPORT FOR AILLEBRACK FROM SAND DUNES MONITORING PROJECT (SDM) (Delaney *et al.*, 2013)**

## SITE 100 AILLEBRACK

The following individual site report should be read in conjunction with the main report (Delaney *et al.*, 2013). Please note that CMP refers to the Coastal Monitoring Project (Ryle *et al.*, 2009) and SDM refers to the Sand Dunes Monitoring Project (Delaney *et al.*, 2013). Unless otherwise stated, the baseline maps refer to the habitat maps produced during the CMP. These baseline maps were revised, to account for discrepancies in the original survey, before comparisons were made with the habitat maps produced during the SDM (see section 2.3 in SDM main report). These revised maps are referred to as the revised baseline maps in the following text.

### 1 SITE DESCRIPTION

Aillebrack is a medium sized site located 4 km south-west of Ballyconneely, on the western seaboard of Co. Galway, and is situated on the southern shore of the Slyne Head Peninsula. It comprises a series of small sandy bays. The site forms part of the Slyne Head Peninsula SAC (SAC 002074). Six Annex I sand dune habitats (* indicates a priority habitat) were recorded here during the CMP: **1210 Annual vegetation of drift lines, 2110 Embryonic shifting dunes, 2120 Marram dunes (white dunes), *2130 Fixed dunes (grey dunes), 2190 Humid dune slacks** and ***21A0 Machairs** (Ryle *et al.*, 2009). Other Annex I habitats linked with the machair system include **1150 Coastal lagoons, 1170 Reefs, 1160 Large shallow inlets and bays and 4030 European dry heaths.** Maërl beds are known to occur in Mannin Bay (De Grave *et al.*, 2000) and many of the beaches in the area are composed of maërl fragments. The Annex II rare liverwort species, *Petalophyllum ralfsii* (Petalwort), has been previously recorded in a number of locations within the ***21A0 Machairs** habitat found at Aillebrack. The population of *Petalophyllum ralfsii* within the SAC is the largest known in both Ireland and the world (NPWS, 2003). It was not recorded during the SDM. Three species listed on Annex I of the E.U. Birds Directive are known to breed within this SAC: Chough (*Pyrrhocorax pyrrhocorax*), Sandwich Tern (*Sterna sandvicensis*) and Common Tern (*Sterna hirundo*). Lapwing (*Vanellus vanellus*) was the only notable bird species recorded during the SDM.

The dune system at Aillebrack is a very mature system and it has a reduced sediment input resulting in poorly developed foredune habitats and coastal retreat (Crawford *et al.*, 1996). There is no indication that sediment starvation has been caused by human activities however. Rocky outcrops are a common feature of the site. The site has two main uses, amenity and agriculture. There is a caravan park present within the ***21A0 Machairs** habitat in the western end of the site, and an adjacent golf course. The ***21A0 Machairs** habitat is grazed by both horses and cattle, with the majority being managed as commonage.

## 2 CONSERVATION ASSESSMENTS

### 2.1 Overview

Aillebrack was surveyed on the 14th and 15th of July 2011. The site was revisited on the 21st of September when two further monitoring stops were carried out in the **2120 Marrram dunes (white dunes).** Of the six Annex I habitats recorded on the site during the baseline survey, four were recorded in 2011. **1220 Perennial vegetation of stony banks** was also found, but it was below the minimum monitoring area and was therefore not assessed. ***2130 Fixed dunes (grey dunes)** and **2190 Humid dune slacks** were re-mapped as ***21A0 Machairs** habitat when the site was visited in 2011. The habitats found at Aillebrack in 2011 and the results of the conservation assessments are presented in Table 1. Two of the habitats, **1210 Annual vegetation of drift lines** and **2120 Marram dunes (white dunes)** were assessed as Favourable, while **2110 Embryonic shifting dunes** and ***21A0 Machairs** were assessed as Unfavourable-Inadequate.

**Table 1**. Conservation assessment results for all Annex I dune habitats surveyed at Aillebrack, Co. Galway.

| Habitat | Area | Structure & Functions | Future Prospects | Overall result |
|---|---|---|---|---|
| 1210 Annual vegetation of drift lines | Favourable (stable) | Favourable (stable) | Favourable (stable) | Favourable (stable) |
| 2110 Embryonic shifting dunes | Favourable (stable) | Unfavourable-Inadequate (deteriorating) | Unfavourable-Inadequate (stable) | Unfavourable-Inadequate (deteriorating) |
| 2120 Marram dunes (white dunes) | Favourable (stable) | Favourable (stable) | Favourable (improving) | Favourable (improving) |
| *21A0 Machairs | Favourable (improving) | Unfavourable-Inadequate (stable) | Unfavourable-Inadequate (stable) | Unfavourable-Inadequate (improving) |

#### *2.1.1 Area*

The areas of Annex I sand dune habitats at Aillebrack are presented in Table 2. Some of the habitats had revisions made to their baseline areas. There was a small change in the baseline area of **1210 Annual vegetation of drift lines** because of a more detailed mapping methodology in 2011. An area which had previously been mapped as ***2130 Fixed dunes (grey dunes)** was remapped as ***21A0 Machairs** after it was visited in 2011. It was a somewhat marginal area of shallow sand over rock, but the community was very similar to the surrounding ***21A0 Machairs** habitat. A dune slack had been mapped during the baseline survey, but the individual site report for Aillebrack indicates that there was an argument to retain it within the ***21A0 Machairs** habitat. Local sources indicated that sand extraction in the 1970's had caused the creation of a hollow, and parts of the hollow are very damp. Wet machair is well-represented at Aillebrack and species typical of damp conditions such as *Hydrocotyle vulgaris*, *Carex nigra* and *Potentilla anserina* are found in wetter patches outside the hollow as well as within it. The decision was taken to reclassify the **2190 Humid dune slacks** habitat as ***21A0 Machairs** during the SDM, and the baseline maps were revised accordingly. A caravan site has been built on part of the machair plain west of the golf course, and this had been mapped as amenity grassland during the CMP. The vegetation appeared to be typical of ***21A0 Machairs**, and it was mapped as ***21A0 Machairs** with built ground and labelled "not surveyed". This area (8.59 ha) is not included in the areas presented in Table 2. A small area of **1220 Perennial vegetation of stony banks,** below the minimum monitoring area, was

mapped in 2011. **1220 Perennial vegetation of stony banks** habitat was not recorded during the CMP. The site has increased in size since the baseline survey due to accretion and colonisation.

**Table 2**. Areas of Annex I dune habitats originally mapped at Aillebrack during the baseline survey (Coastal Monitoring Project), the revised baseline areas and areas mapped during the Sand Dune Monitoring Project in 2011.

| Habitat | Baseline survey (ha) | Revised baseline (ha) | Sand Dunes Monitoring Project (ha) |
|---|---|---|---|
| 1210 Annual vegetation of drift lines | 0.60 | 0.59 | 0.37 |
| 1220 Perennial vegetation of stony banks | 0.00 | 0.00 | 0.04 |
| 2110 Embryonic shifting dunes | 0.56 | 0.56 | 0.71 |
| 2120 Marram dunes (white dunes) | 0.18 | 0.18 | 0.27 |
| *2130 Fixed dunes (grey dunes) | 1.32 | 0.00 | 0.00 |
| 2190 Humid dune slacks | 0.65 | 0.00 | 0.00 |
| *21A0 Machairs | 78.49 | 81.52 | 81.81 |
| Total | 81.80 | 82.85 | 83.20 |

### *2.1.2 Structure and Functions*

Structure and Functions were assessed for four habitats at Aillebrack. Table 3 shows the results of the Structure and Functions assessment. The Structure and Functions of **1220 Perennial vegetation of stony banks** were not assessed as the habitat was just below the minimum monitoring area at 350 m$^2$. Of the other four habitats recorded in 2011, two had favourable Structure and Functions – **1210 Annual vegetation of drift lines** and **2120 Marram dunes (white dunes),** while the other two habitats each had criterion that failed. **2110 Embryonic shifting dunes** and ***21A0 Machairs** were assessed as having Unfavourable-Inadequate Structure and Functions.

**Table 3.** Annex I sand dune habitats at Aillebrack for which Structure and Functions were assessed, with the number of monitoring stops, assessment criteria and the number of criteria that failed.

| Habitat | No. monitoring stops | Total no. assessment criteria | No. failed criteria |
|---|---|---|---|
| 1210 Annual vegetation of drift lines | 2 | 6 | 0 |
| 2110 Embryonic shifting dunes | 4 | 7 | 1 |
| 2120 Marram dunes (white dunes) | 2 | 7 | 0 |
| *21A0 Machairs | 12 | 10 | 2 |

### *2.1.3 Future Prospects*

Impacts and activities recorded at Aillebrack are presented in Table 4. Impact codes are assigned according to Ssymanck (2010). **1220 Perennial vegetation of stony banks** and **2120 Marram dunes (white dunes)** had no impacts recorded, while **1210 Annual vegetation of drift lines** had only one impact, walking with a neutral effect. Grazing was seen to have a negative effect on **2110 Embryonic shifting dunes**, but it had a positive effect on ***21A0 Machairs**. ***21A0 Machairs** had the highest number of impacts recorded, with the majority being negative and associated with recreation. Agricultural intensification and off-road driving were the most serious threats to the habitat recorded in 2011.

**Table 4.** Impacts recorded in Annex I sand dune habitats at Aillebrack in 2011. Source refers to whether the impact being scored originates inside or outside the Annex I habitat being assessed.

| Habitat code | Impact code | Impact description | Intensity | Effect | Percent of habitat | Source |
|---|---|---|---|---|---|---|
| 1210 | G01.02 | Walking | Low | Neutral | 100 | Inside |
| 1220 | X | No impacts | - | - | 100 | - |
| 2110 | A04.02.01 | Cattle grazing | Low | Negative | 30 | Inside |
| 2110 | G01.02 | Walking | Low | Neutral | 30 | Inside |
| 2120 | X | No impacts | - | - | 100 | - |
| *21A0 | A02.01 | Agricultural Intensification | High | Negative | 5 | Inside |
| *21A0 | A04.02.01 | Cattle grazing | Medium | Positive | 95 | Inside |
| *21A0 | A04.02.03 | Horse grazing | Medium | Positive | 5 | Inside |
| *21A0 | A04.03 | Undergrazing | Medium | Negative | 5 | Inside |
| *21A0 | G01.02 | Walking and horse-riding | Low | Neutral | 30 | Inside |
| *21A0 | G01.03.02 | Off-road driving | High | Negative | 10 | Inside |
| *21A0 | G01.08 | Golf | Low | Negative | 5 | Inside |
| *21A0 | G02.07 | Sports pitch | Low | Negative | 5 | Inside |
| *21A0 | G02.08 | Camping/Caravans | Medium | Negative | 1 | Inside |
| *21A0 | H05.01 | Dumping | Low | Negative | 1 | Inside |

## 2.2 Annex I habitat assessments

The conservation status of the Annex I habitats at Aillebrack is discussed below. The present conservation status in 2011 is compared with the baseline status and if a habitat is not in Favourable status, the main reasons for the Unfavourable assessment are given. Areas recorded in 2011 are compared with the revised baseline areas. It should be borne in mind that natural processes such as erosion, deposition and succession are primary drivers of change on coastal habitats.

### *2.2.1 1210 Annual vegetation of drift lines*

**1210 Annual vegetation of drift lines** is distributed in small patches along the coast at Aillebrack. Although very fragmented, organic debris is plentiful and the vegetation is relatively lush.

Area

The area of **1210 Annual vegetation of drift lines** has decreased from 0.59 ha during the baseline survey to 0.37 ha during the SDM. This is due primarily to succession of the habitat to **2110 Embryonic shifting dunes** and **2120 Marram dunes (white dunes)**. There was no sign of anthropogenic loss at the site. During the CMP, Area was assessed as Favourable. Area was assessed as Favourable (stable) during the SDM.

Structure and Functions

All of the criteria passed in the Structure and Functions assessment. During the CMP, Structure and Functions were assessed as Favourable. Structure and Functions were assessed as Favourable (stable) during the SDM.

Future Prospects

The only impact recorded within this habitat was walking, and this had a neutral impact. During the CMP, Future Prospects were assessed as Favourable. Future Prospects were assessed as Favourable (stable) during the SDM.

Conservation assessment

All of the parameters were assessed as Favourable during the SDM and CMP. The conservation status of **1210 Annual vegetation of drift lines** was therefore assessed as Favourable (stable) in 2011.

### *2.2.2 1220 Perennial vegetation of stony banks*

There is one very small fragment of this habitat at Aillebrack, but it was below the minimum monitoring area. The conservation status was therefore not assessed. No impacts were recorded for the habitat.

### *2.2.3 2110 Embryonic shifting dunes*

There are narrow strips of **2110 Embryonic shifting dunes** scattered along the shore at Aillebrack. Accretion is very slow and interrupted at this site, and sediment availability is low.

Area

The area of **2110 Embryonic shifting dunes** has increased from 0.56 ha during the CMP to 0.71 ha during the SDM. Area was assessed as Unfavourable-Bad during the CMP. No indication was given at that time that there was any evidence of anthropogenic loss to the habitat, and it would probably have been assessed as Favourable under the current methodology. Area was assessed as Favourable (stable) during the SDM.

Structure and Functions

The criterion assessing damage due to disturbance failed in the Structure and Functions assessment because of evidence of trampling within the habitat. During the CMP, Structure and Functions were assessed as Favourable, although no monitoring stops were carried out. Structure and Functions were assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Future Prospects

Grazing cattle have damaged the **2110 Embryonic shifting dunes**. During the CMP, no negative impacts were recorded, but Future Prospects were assessed as Unfavourable-Bad because the habitat was unlikely to increase in area. Recreational pressures were also mentioned. In the absence of human activities interfering with sediment dynamics at the site, limited potential for accretion would not have resulted in an Unfavourable assessment under the SDM methodology. The recreational pressures had negative effects which would have resulted in an assessment of Unfavourable-Inadequate. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Conservation assessment

Two of the parameters were assessed as Unfavourable-Inadequate and one was assessed as Favourable. During the CMP, the habitat was assessed as Unfavourable-Bad, and this was mainly due to the effects of erosion and sediment starvation on the area and potential for accretion at the site. These are naturally occurring impacts and would not have resulted in a negative assessment during the SDM. The conservation assessment of **2110 Embryonic shifting dunes** was Unfavourable-Inadequate (deteriorating) during the SDM because Structure and Functions had declined from Favourable to Unfavourable-Inadequate while the other two parameters have not obviously changed.

### *2.2.4 2120 Marram dunes (white dunes)*

This habitat is restricted to the western side of the site and is very fragmented.

Area

The area of **2120 Marram dunes (white dunes)** increased from 0.18 ha during the CMP to 0.27 ha during the SDM. There is no evidence of habitat loss due to human activities. During the CMP, Area was assessed as Unfavourable-Bad due to the limited extent of the habitat. There was no suggestion that this was the result of human activities and Area would probably have been assessed as Favourable under the current methodology. Area was assessed as Favourable (stable) during the SDM.

Structure and Functions

All of the criteria passed in the Structure and Functions assessment. During the baseline survey, Structure and Functions were assessed as Favourable, although no monitoring stops were carried out. Structure and Functions were assessed as Favourable (stable) during the SDM.

Future Prospects

No impacts were recorded in this habitat during the SDM. The main recreational activities and trampling by grazers is focussed on the beach and **2110 Embryonic shifting dunes**. During the CMP, Future Prospects were assessed as Unfavourable-Bad because of recreational pressures and limited potential for accretion, although no impacts were listed for the habitat. Future Prospects were assessed as Favourable (improving) during the SDM.

Conservation assessment

All of the parameters were assessed as Favourable during the SDM. During the CMP, the habitat was assessed as Unfavourable-Bad because of limited extent, lack of potential for accretion and recreational pressures. Sediment depletion appears to be a natural process at this site and was not considered to be a negative impact under the SDM. Recreational pressures appear to have decreased since the CMP was carried out. The conservation status of **2120 Marram dunes (white dunes)** were assessed as Favourable (improving) during the SDM.

### *2.2.5 *21A0 Machairs*

This is the most extensive habitat at Aillebrack. There are signs that sand extraction occurred in the past in the northeast of the site, and a local landowner confirmed this and said that the

extraction ceased during the 1970s. Vertical faces adjacent to a wet hollow remain visible, but the ***21A0 Machairs** community has colonised the excavated area. The vegetation is species-rich at Aillebrack and features such as rocky outcrops and seepages add to the diversity. The parts of the habitat which have been enclosed are less species rich and more agricultural in character.

Area

There was a very small increase in the area of ***21A0 Machairs** from 81.52 ha during the CMP to 81.81 ha during the SDM. During the CMP, Area was assessed as Unfavourable-Inadequate because the development of a caravan park on the ***21A0 Machairs** had caused habitat loss. The caravan park was established prior to the implementation of the Habitats Directive (Kindermann & Gormally, 2010) and was excluded from the SAC. To maintain a consistent approach across all sites assessed, the caravan park was mapped as ***21A0 Machairs** with built land but was marked as "not surveyed" and excluded from the Area assessment during the SDM. Photographic evidence suggests that there was habitat damage and loss due to driving and recreation in the south of the site at the time of the CMP. This was mapped as **2110 Embryonic shifting dunes** during the CMP. By 2011, it had revegetated and stabilised and the recovery caused an increase in the area of ***21A0 Machairs** at Aillebrack. Area was assessed as Favourable (improving) during the SDM.

Structure and Functions

Two of the criteria failed in the Structure and Functions assessment. Disturbance due to walking, driving, caravans, golf and horse riding had caused damage to the habitat by exposing bare sand and compacting the substrate. *Lolium perenne* was present in six of the twelve monitoring stops, indicating that part of the habitat probably experienced reseeding at some time in the past. During the CMP, *Lolium perenne* was present, but was not problematic. There may have been a slight increase in the abundance of *Lolium perenne* since the baseline survey, but reseeding was not carried out in that time. Damage due to disturbance was not assessed as part of the Structure and Functions assessment during the CMP. Aerial photographs suggest that damage due to driving was quite extensive during the CMP, and horse-racing was mentioned as affecting the future prospects. A study of the effects of vehicle damage confirmed the existence of a network of tracks that were present on the site in 2005 and 2007 (Kindermann & Gormally, 2010). The degree of damage associated with vehicles and horse racing described by Kindermann & Gormally (2010) would have resulted in the Structure and Functions being assessed as Unfavourable-Inadequate under the current methodology. During the SDM, Structure and Functions were assessed as Unfavourable-Inadequate (stable).

Future Prospects

Horse and cattle grazing were recorded as positive impacts affecting 95% of the habitat. Seven negative impacts were recorded. Undergrazing and agricultural intensification were each recorded at 5% of the habitat. Activities associated with recreation including off-road driving, golf, sports pitches and camping & caravans were recorded. Evidence of dumping was also seen on the site. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate because of pressures relating to recreation. Other impacts listed during the CMP included agricultural improvement, undergrazing, sand and gravel extraction, discontinuous urbanisation, household dumping, paths and tracks, the golf course, sports pitches, caravans, walking, motorised vehicles

and pollution or other human impacts. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Conservation assessment

Two of the assessment parameters were assessed as Unfavourable-Inadequate during the SDM, and one as Favourable. This is an improvement on the CMP, when all three parameters would have been assessed as Unfavourable-Inadequate under the current methodology. The conservation status of ***21A0 Machairs** was assessed as Unfavourable-Inadequate (improving) during the SDM.

## 3 Discussion

### 3.1 Recreation

With a caravan park, beaches, good access routes and a golf course, Aillebrack is a popular tourist destination. Horse racing is held on the machair plain in late summer, and this brings large numbers of vehicles which park on the ***21A0 Machairs**. The racing itself causes damage to the substrate and sand compaction is likely to occur on the racecourse. According to the CMP site report, sand was brought in to repair the damage associated with the racing in the years prior to 2004. In the context of a habitat which is dependant on sand with a high calcium content, this is a cause for concern. Racing took place in 2011 and 2012. The most obvious sign of damage to the habitat due to recreation at Aillebrack is the network of paths and tracks leading to the shore. Vehicle damage has been shown to reduce the number and diversity of plant species in coastal areas (Kindermann and Gormally, 2010), and breaking up the layer of vegetation which binds the sand together increases the likelihood of storm damage.

### 3.2 Agriculture

Current agricultural practices are generally favourable at Aillebrack. Reseeding has not been carried out since the CMP, and over time, the effects of historic reseeding are expected to diminish. There are some enclosed fields which are more likely to be improved than the part of the site which is managed as commonage, and these have a more agricultural flora than the open machair plain. Cattle have access to the fore dune habitats, and their presence has resulted in some damage as they trample the vegetation and disturb the substrate.

### 3.3 Sediment depletion and natural processes

Sediment depletion has been noted as affecting Aillebrack, and it is believed that in the past, the machair plain was more extensive than it is at present (Crawford *et al.*, 1996). There are no indications that the reduction in sediment availability is the result of human activities. There are no coastal constructions such as groynes in the area which might alter the sediment deposition, and although maërl extraction has occurred in Kilkieran Bay, there is no indication that maërl has been extracted from Mannin Bay. The current amount of sediment input is most likely to be consistent with the natural processes affecting the site.

## 4 REFERENCES


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.

De Grave, S., Fazakerley, H., Kelly, L., Guiry, M.D., Ryan, M. and Walshe, J. (2000) A study of selected maërl beds in Irish waters and their potential for sustainable extraction. A report submitted to the Marine Institute, Galway.

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

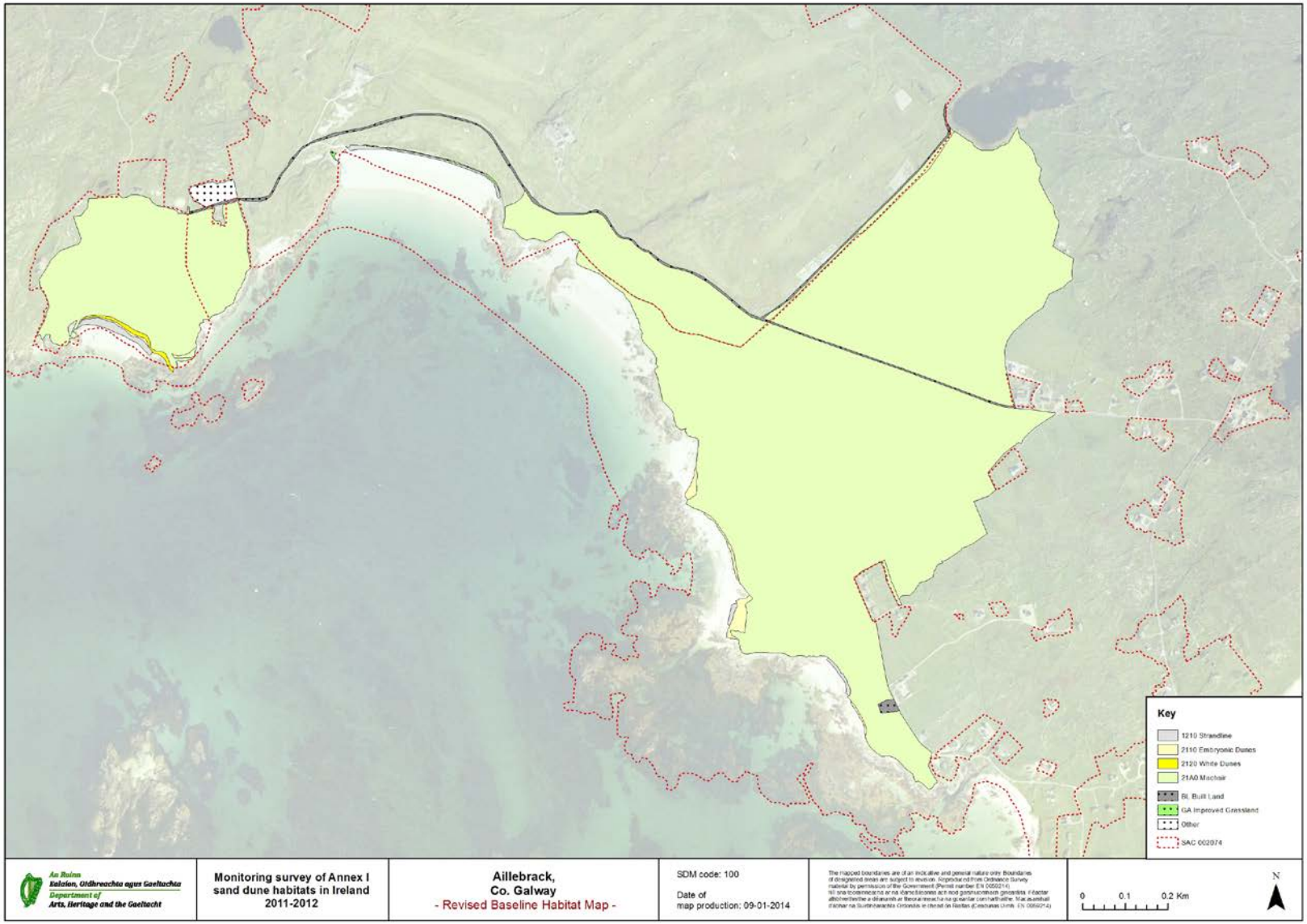
Kindermann, G. and Gormally, M.J. (2010) Vehicle damage caused by recreational use of coastal dune systems in a Special Area of Conservation (SAC) on the west coast of Ireland. *Journal of Coastal Conservation*, **14**, 173-188.

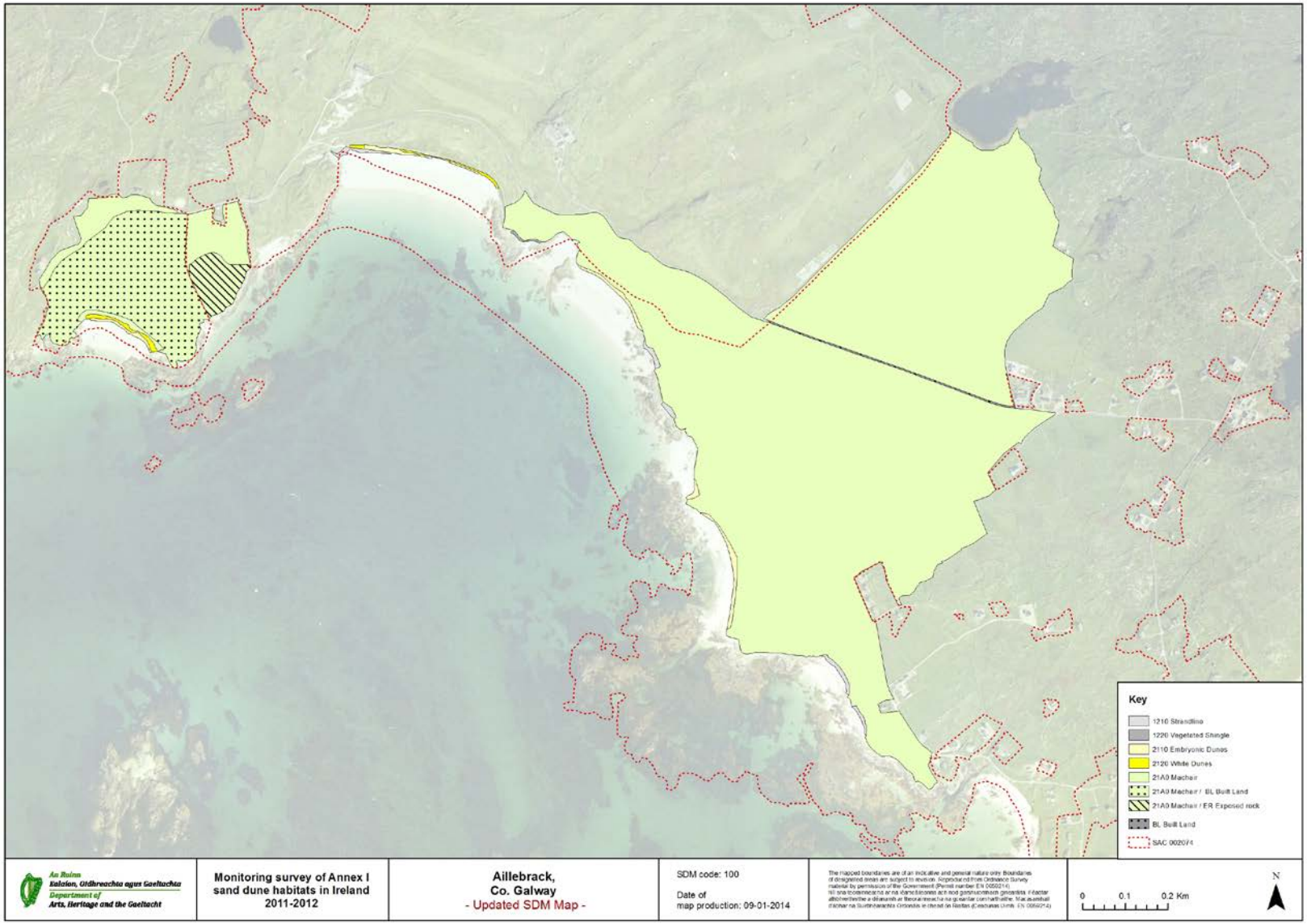
NPWS (1996) Natura 2000 Standard Data Form, Site 002074. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. http://www.npws.ie/media/npwsie/content/images/protectedsites/natura2000/NF002074.pdf. Accessed March 2013.

NPWS (2003) SAC site synopsis for SAC 002074 Slyne Head Peninsula. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. http://www.npws.ie/media/npwsie/content/images/protectedsites/sitesynopsis/SY002074.pdf. Accessed March 2013.

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.

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.


Key
1210 Strandline
2110 Embryonic Dunes
2120 White Dunes
21A0 Machair
BL Built Land
GA Improved Grassland
Other
SAC 002074
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Monitoring survey of Annex I sand dune habitats in Ireland 2011-2012
Aillebrack, Co. Galway
- Revised Baseline Habitat Map -
SDM code: 100
Date of map production: 09-01-2014
0 0.1 0.2 Km
N


Key
1210 Strandline
1220 Vegeteted Shingle
2110 Embryonic Dunes
2120 White Dunes
21A0 Machair
21A0 Machair / BL Built Land
21A0 Machair / ER Exposed rock
BL Beilt Land
SAC 002074
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Monitoring survey of Annex I sand dune habitats in Ireland 2011-2012
Aillebrack, Co. Galway
- Updated SDM Map -
SDM code: 100
Date of map production: 09-01-2014
0 0.1 0.2 Km
N

## APPENDIX VII: SITE REPORT AND HABITAT MAPS FOR DOONLOUGHAN FROM SAND DUNES MONITORING PROJECT (Delaney et *al., 2013)*

### SITE 101 DOONLOUGHAN

The following individual site report should be read in conjunction with the main report (Delaney *et al.*, 2013). Please note that CMP refers to the Coastal Monitoring Project (Ryle *et al.*, 2009) and SDM refers to the Sand Dunes Monitoring Project (Delaney *et al.*, 2013). Unless otherwise stated, the baseline maps refer to the habitat maps produced during the CMP. These baseline maps were revised, to account for discrepancies in the original survey, before comparisons were made with the habitat maps produced during the SDM (see section 2.3 in SDM main report). These revised maps are referred to as the revised baseline maps in the following text.

### 1 SITE DESCRIPTION

Doonloughan is a large site situated on the northern shores of Slyne Head Peninsula, approximately 3.5 km north-west of Ballyconneely, Co. Galway. It comprises small numerous north-west facing bays. The site forms part of the Slyne Head Peninsula SAC (SAC 002074). Five Annex I sand dune habitats (* indicates a priority habitat) were recorded here during the CMP: **1210 Annual vegetation of drift lines, 1220 Perennial vegetation of stony banks, 2110 Embryonic shifting dunes, 2170 Dunes with creeping willow** and ***21A0 Machairs** (Ryle *et al.,* 2009). Other Annex I habitats associated with the coast at Doonloughan include **1160 Large shallow inlets and bays, 1170 Reefs, 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), and 4030 European dry heaths.** Maërl beds are known to occur in Mannin Bay (De Grave *et al.,* 2000) and many of the beaches in the area are composed of maërl fragments. The Annex II rare liverwort species, *Petalophyllum ralfsii* (Petalwort), has been previously recorded in a number of locations within the ***21A0 Machairs** habitat found at Doonloughan. The population of *Petalophyllum ralfsii* within the SAC is the largest known in both Ireland and the world (NPWS, 2003). It was not recorded during the CMP or the SDM however. Three species listed on Annex I of the E.U. Birds Directive are known to breed within this SAC, Chough (*Pyrrhocorax pyrrhocorax*), Sandwich Tern (*Sterna sandvicensis*) and Common Tern (*Sterna hirundo*), with Chough observed during the SDM. The notable species Lapwing (*Vanellus vanellus*) and hares (*Lepidus timidus hibernicus*) were noted during the CMP, but were not observed during the SDM.

Similar to the dune system at Aillebrack, which is found on the southern shores of Slyne Head Peninsula, Doonloughan is a very mature system and has a reduced sediment input, resulting in poorly-developed foredune habitats and coastal retreat (Crawford *et al.,* 1996). There is no indication that sediment starvation has been caused by human activities however. The main land-use for the site is agriculture, with cattle, sheep and horses grazing within the ***21A0 Machairs** habitat. The site is also accessed by day-trippers and tourists, with a public road running along the southern boundary of the site. The high level of exposure to the elements makes this site less attractive for tourists than other sites in the locality.

## 2 CONSERVATION ASSESSMENTS

### 2.1 Overview

Doonloughan was surveyed on the 13th of September 2011. Of the five Annex I habitats recorded on the site during the baseline survey, only three were recorded in 2011. The habitats found at Doonloughan in 2011 and the results of the conservation assessments are presented in Table 1. Both **2110 Embryonic shifting dunes** and ***21A0 Machairs** were assessed as Unfavourable-Inadequate. **1220 Perennial vegetation of stony banks,** though present in 2011, could not be assessed as it was below the minimum monitoring area.

**Table 1.** Conservation assessment results for all Annex I dune habitats surveyed at Doonloughan, Co. Galway.

| Habitat | Area | Structure & Functions | Future Prospects | Overall result |
|---|---|---|---|---|
| 2110 Embryonic shifting dunes | Favourable (Improving) | Unfavourable-Inadequate (Deteriorating) | Unfavourable-Inadequate (Improving) | Unfavourable-Inadequate (Improving) |
| *21A0 Machairs | Unfavourable-Inadequate (Deteriorating) | Unfavourable-Inadequate (Stable) | Unfavourable-Inadequate (Stable) | Unfavourable-Inadequate (Deteriorating) |

#### *2.1.1 Area*

The areas of Annex I sand dune habitats at Doonloughan are presented in Table 2. The baseline areas of **2170 Dunes with creeping willow** and ***21A0 Machairs** were revised after the site was visited in 2011. On examination, although *Salix repens* was present, it was too sparse over most of the area mapped to qualify as **2170 Dunes with creeping willow**. The other plants present were consistent with wet ***21A0 Machairs**, and the polygon of **2170 Dunes with creeping willow** was reclassified as ***21A0 Machairs.** Rocky outcrops and wet grassland had been included in the ***21A0 Machairs,** and these were excluded in the revised baseline maps. There has been a slight decrease in the total area of Annex I sand dune habitats at Doonloughan, and this is due to erosion of damaged ***21A0 Machairs** and loss of **1210 Annual vegetation of drift lines**.

**Table 2**. Areas of Annex I dune habitats originally mapped at Doonloughan during the baseline survey (Coastal Monitoring Project), the revised baseline areas and areas mapped during the Sand Dune Monitoring Project in 2011.

| Habitat | Baseline survey (ha) | Revised baseline (ha) | Sand Dunes Monitoring Project |
|---|---|---|---|
| 1210 Annual vegetation of drift lines | 0.16 | 0.16 | 0.00 |
| 1220 Perennial vegetation of stony | 0.03 | 0.03 | 0.02 |
| 2110 Embryonic shifting dunes | 0.62 | 0.62 | 0.61 |
| 2170 Dunes with creeping willow | 0.79 | 0.00 | 0.00 |
| *21A0 Machairs | 121.11 | 113.62 | 113.27 |
| Total | 122.71 | 114.43 | 113.90 |

### *2.1.2 Structure and Functions*

Structure and Functions were assessed for two habitats at Doonloughan. Table 3 shows the results of the Structure and Functions assessment. Both **2110 Embryonic shifting dunes** and ***21A0 Machairs** were assessed as Unfavourable-Inadequate due to the failure of one and two criteria respectively. **1220 Perennial vegetation of stony banks** was not assessed as it was below the minimum monitoring area.

**Table 3.** Annex I sand dune habitats at Doonloughan for which Structure and Functions were assessed, with the number of monitoring stops, assessment criteria and the number of criteria that failed.

| Habitat | No. monitoring stops | Total no. assessment criteria | No. failed criteria |
|---|---|---|---|
| 2110 Embryonic shifting dunes | 4 | 7 | 1 |
| *21A0 Machairs | 16 | 10 | 2 |

### *2.1.3 Future Prospects*

Impacts and activities recorded at Doonloughan are presented in Table 4. Impact codes are assigned according to Ssymanck (2010). **1220 Perennial vegetation of stony banks** had no recorded impacts during the SDM. Walking was recorded as a neutral impact for **2110 Embryonic shifting dunes,** however off-road driving negatively impacted on a small percentage of this habitat. ***21A0 Machairs** had the most impacts recorded, with eight of the ten recorded having a negative impact on the habitat. Sheep grazing was the most significant of these.

**Table 4.** Impacts recorded in Annex I sand dune habitats at Doonloughan in 2011. Source refers to whether the impact being scored originates inside or outside the Annex I habitat being assessed.

| Habitat code | Impact code | Impact description | Intensity | Effect | Percent of habitat | Source |
|---|---|---|---|---|---|---|
| 1220 | X | No impacts | - | - | 100 | - |
| 2110 | G01.02 | Walking | Low | Neutral | 100 | Inside |
| 2110 | G01.03.02 | Off-road driving | High | Negative | 15 | Inside |
| *21A0 | A02.01 | Agricultural improvement | Medium | Negative | 1 | Inside |
| *21A0 | A04.02.01 | Cattle grazing | Low | Neutral | 95 | Inside |
| *21A0 | A04.02.02 | Sheep grazing | Medium | Negative | 95 | Inside |
| *21A0 | A04.02.03 | Horse grazing | Low | Positive | 1 | Inside |
| *21A0 | D01.01 | Paths/Tracks | High | Negative | 5 | Inside |
| *21A0 | G01.02 | Walking | Low | Negative | 20 | Inside |
| *21A0 | G01.03.02 | Off-road driving | Medium | Negative | 15 | Inside |
| *21A0 | G02.08 | Caravans/camping | Low | Negative | 1 | Inside |
| *21A0 | G05 | Campfires | High | Negative | 1 | Inside |
| *21A0 | K01.01 | Erosion | Medium | Negative | 5 | Inside |

## 2.2 Annex I habitat assessments

The conservation status of the Annex I habitats at Doonloughan is discussed below. The present conservation status in 2011 is compared with the baseline status and if a habitat is not in

Favourable status, the main reasons for the Unfavourable assessment are given. Areas recorded in 2011 are compared with the revised baseline areas. It should be noted that natural processes such as erosion, deposition and succession are primary drivers of change on coastal habitats.

### *2.2.1 1210 Annual vegetation of drift lines*

**1210 Annual vegetation of drift lines** were recorded during the baseline survey but were not present in 2011. This loss of habitat was not believed to be associated with human activity. The conservation status was not assessed.

### *2.2.2 1220 Perennial vegetation of stony banks*

The area previously mapped as **1220 Perennial vegetation of stony banks** had disappeared since the baseline survey, but another patch had developed to the south-west by 2011. This was below the minimum monitoring area and therefore no conservation status assessment was carried out. There were no impacts recorded for this habitat in 2011. The **1220 Perennial vegetation of stony banks** was located close to formerly damaged parts of the ***21A0 Machairs** habitat which were in the process of revegetating during the survey in 2011.

### *2.2.3 2110 Embryonic shifting dunes*

**2110 Embryonic shifting dunes** are fragmented and limited in extent at this site. There is little sand available for sand dune accretion, and strong winds tend to blow sand far into the ***21A0 Machairs.** In the past, sediment extraction was a major problem, but this had ceased by 2009 (NPWS, 2009), and there was no sign of active extraction in 2011.

Area

The area of **2110 Embryonic shifting dunes** had decreased very slightly from 0.62 ha during the CMP to 0.61 ha during the SDM. During the survey in 2011, there was no clear evidence that human activity had an impact on the area of **2110 Embryonic shifting dunes**. During the CMP, Area was assessed as Unfavourable-Bad because of erosion exacerbated by human activities. Area was assessed as Favourable (improving) during the SDM.

Structure and Functions

The criterion assessing damage due to disturbance failed in the Structure and Functions assessment, but all the other criteria passed. The damage is mainly associated with vehicle use. During the CMP, Structure and Functions were assessed as Favourable. Structure and Functions were assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Future Prospects

Walking had a neutral effect on the **2110 Embryonic shifting dunes** at Doonloughan, but driving of vehicles had a high-intensity negative effect on 15% of the habitat. During the CMP, Future prospects were assessed as Unfavourable-Bad because of erosion, sediment depletion, overgrazing, sand extraction and vehicle damage. Although only walking and overgrazing were actually listed as impacts during the CMP. Erosion and sediment depletion are natural processes at this site, and sand extraction had ceased by 2011. Overgrazing was mainly limited to the ***21A0 Machairs** habitat. Future Prospects were assessed as Unfavourable-Inadequate (improving) during the SDM.

Conservation assessment

Two of the parameters were assessed as Unfavourable-Inadequate and one was assessed as Favourable. During the CMP, two parameters were assessed as Unfavourable-Bad and one was assessed as Favourable. There has been some recovery in the habitat since the baseline survey,

mainly due to the cessation of sediment extraction, and the conservation status of **2110 Embryonic shifting dunes** was assessed as Unfavourable-Inadequate (improving) during the SDM.

### *2.2.4 *21A0 Machairs*

This is the dominant habitat at Doonloughan. In the past, archaeological remains have been found at the site, indicating a long history of use by humans.

Area

The area of ***21A0 Machairs** at Doonloughan has decreased from 113.62 ha during the CMP to 113.27 ha during the SDM. Despite partial revegetation in some damaged areas of the habitat, a large area which was previously mapped as ***21A0 Machairs** was composed of bare sand and rock when it was surveyed in 2011. The 2005 aerial photographs show that this part of the site had been damaged by vehicles in the past and this has allowed considerable erosion to take place. The eroded area is equal to 0.94 ha, or 0.83% of the habitat area in the baseline survey. Area was assessed as Favourable during the CMP. Because the loss is less than 1% per year since the baseline survey, Area was assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Structure and Functions

Two of the criteria failed in the Structure and Functions assessment. The sward height was too low, indicating overgrazing throughout the site, and damage due to disturbance was very evident, particularly close to the shore. During the CMP, Structure and Functions were assessed as Unfavourable-Inadequate, mainly because of sward height. Structure and Functions were assessed as Unfavourable-Inadequate (stable) during the SDM.

Future Prospects

Cattle, sheep and horses graze the ***21A0 Machairs** at Doonloughan. Although the stocking density did not appear excessive on the day of survey, the closely cropped sward indicates that a reduction in the grazing level would be beneficial. The main grazers in 2011 were sheep, and as these graze to a very tight sward, they are considered to have a negative effect on the habitat. There is also some limited agricultural improvement affecting 1% of the habitat. The other negative impacts are associated with amenity use. Vehicle tracks have broken through the vegetation exposing the bare sand below and vehicles driving off the more established tracks have caused extensive damage around the shoreline. The closely grazed, damaged sward is more vulnerable to damage by walkers as a result and campfires further fragment the vegetation. This has left the habitat more vulnerable to erosion than would naturally be the case. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate because of overgrazing, erosion, vehicle damage and sand extraction. Other impacts recorded in the habitat included cultivation, discontinuous urbanisation, household dumping, walking and camping on the ***21A0 Machairs** habitat. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Conservation assessment

All three of the parameters were assessed as Unfavourable-Inadequate during the SDM, and this is more negative than the CMP assessment when one parameter was assessed as Favourable and the other two were assessed as Unfavourable-Inadequate. The conservation status of ***21A0 Machairs** at Doonloughan was assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

## 3 DISCUSSION

### 3.1 Sediment depletion

Sediment depletion has been noted as affecting Doonloughan, and it is believed that in the past, the machair plain was more extensive than it is at present (Crawford *et al*., 1996). There are no indications that the reduction in sediment availability is the result of human activities. There are no coastal constructions such as groynes in the area which might alter the sediment deposition, and although maërl extraction has occurred in Kilkieran Bay, there is no indication that maërl has been extracted from Mannin Bay. The current amount of sediment input is most likely to be consistent with the natural processes affecting the site.

### 3.2 Off-road driving

Several tracks lead through the ***21A0 Machairs** from the main access road to the beach at Doonoughan. There is no restriction to vehicle access, and vehicles leaving the road to access the shore enter the machair plain at several locations. A local resident indicated that most of the traffic was composed of camper vans and that local residents rarely drove on the habitat. Vehicle damage has been shown to reduce the number and diversity of plant species in coastal areas (Kindermann and Gormally, 2010), and breaking up the layer of vegetation which binds the sand together increases the likelihood of storm damage. Considerable damage and some loss of habitat due to erosion exacerbated by driving and disturbance has occurred at Doonloughan.

### 3.3 Agriculture

The indications of agricultural improvement were limited to 1% of the area of the ***21A0 Machairs** in 2011, but the generally tightly grazed sward would indicate that the habitat is overgrazed. Sheep were present on the site in September, and the condition of the habitat would indicate that it had been grazed for some time. The recommended management for ***21A0 Machairs** in Ireland is winter grazing by cattle. This type of management allows plants to flower and set seed, but prevents the habitat from becoming rank (Cooper *et al*., 2005). Sheep grazing during the summer months tends to result in a tightly grazed sward which will become less diverse over time if herbaceous species fail to set seed.

## 4 REFERENCES


Cooper, A., McCann, T. and Ballard, E. (2005) The effects of livestock grazing and recreation on Irish machair grassland vegetation. *Plant Ecology*, **181**, 255-267.

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.

De Grave, S., Fazakerley, H., Kelly, L., Guiry, M.D., Ryan, M. and Walshe, J. (2000) A study of selected maërl beds in Irish waters and their potential for sustainable extraction. A report submitted to the Marine Institute, Galway.

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

Kindermann, G. and Gormally, M.J. (2010) Vehicle damage caused by recreational use of coastal dune systems in a Special Area of Conservation (SAC) on the west coast of Ireland. *Journal of Coastal Conservation*, **14**, 173-188.

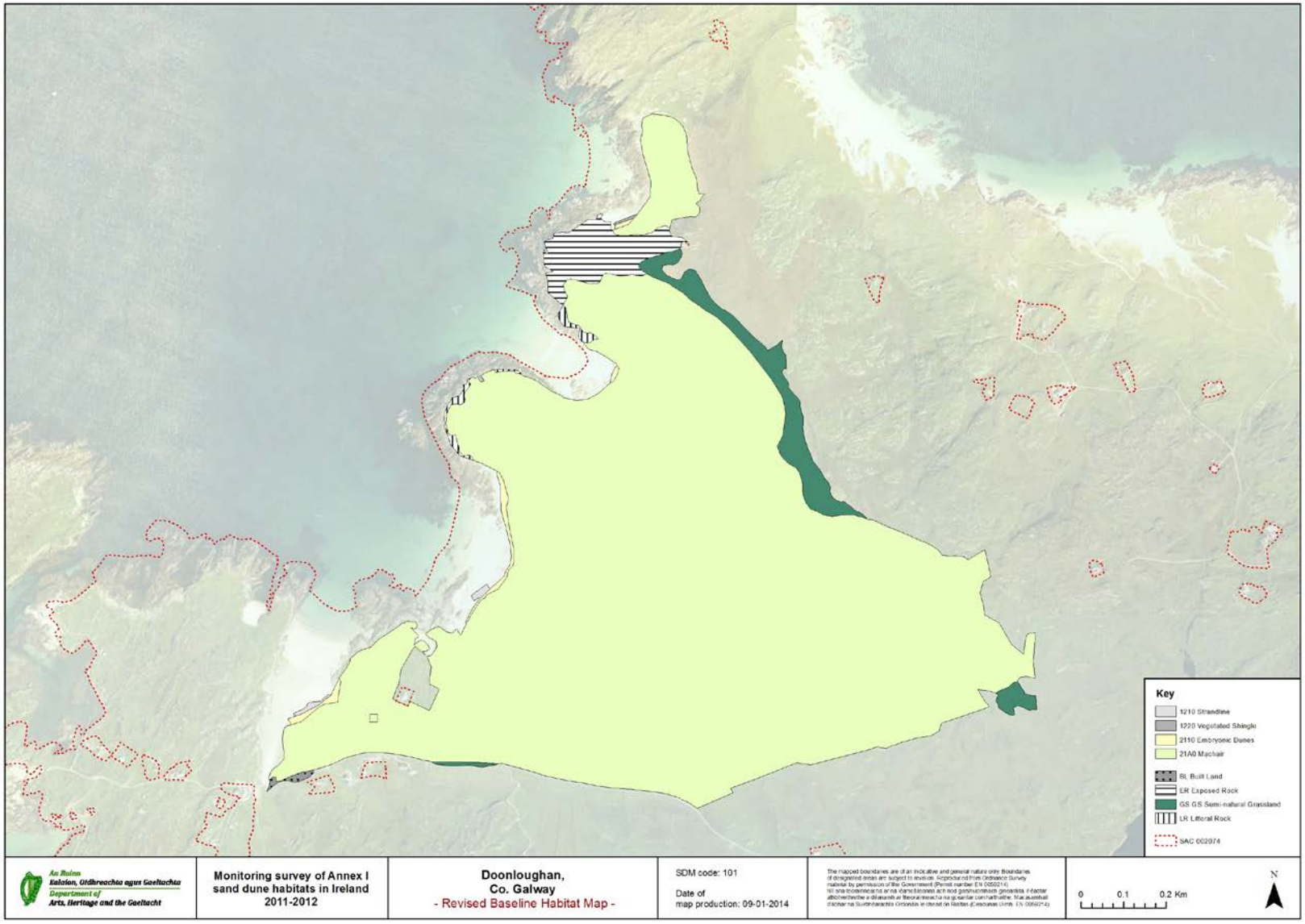
NPWS (1996) Natura 2000 Standard Data Form, Site 002074. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland. http://www.npws.ie/media/npwsie/content/images/protectedsites/natura2000/NF002074.pdf. Accessed March 2013.

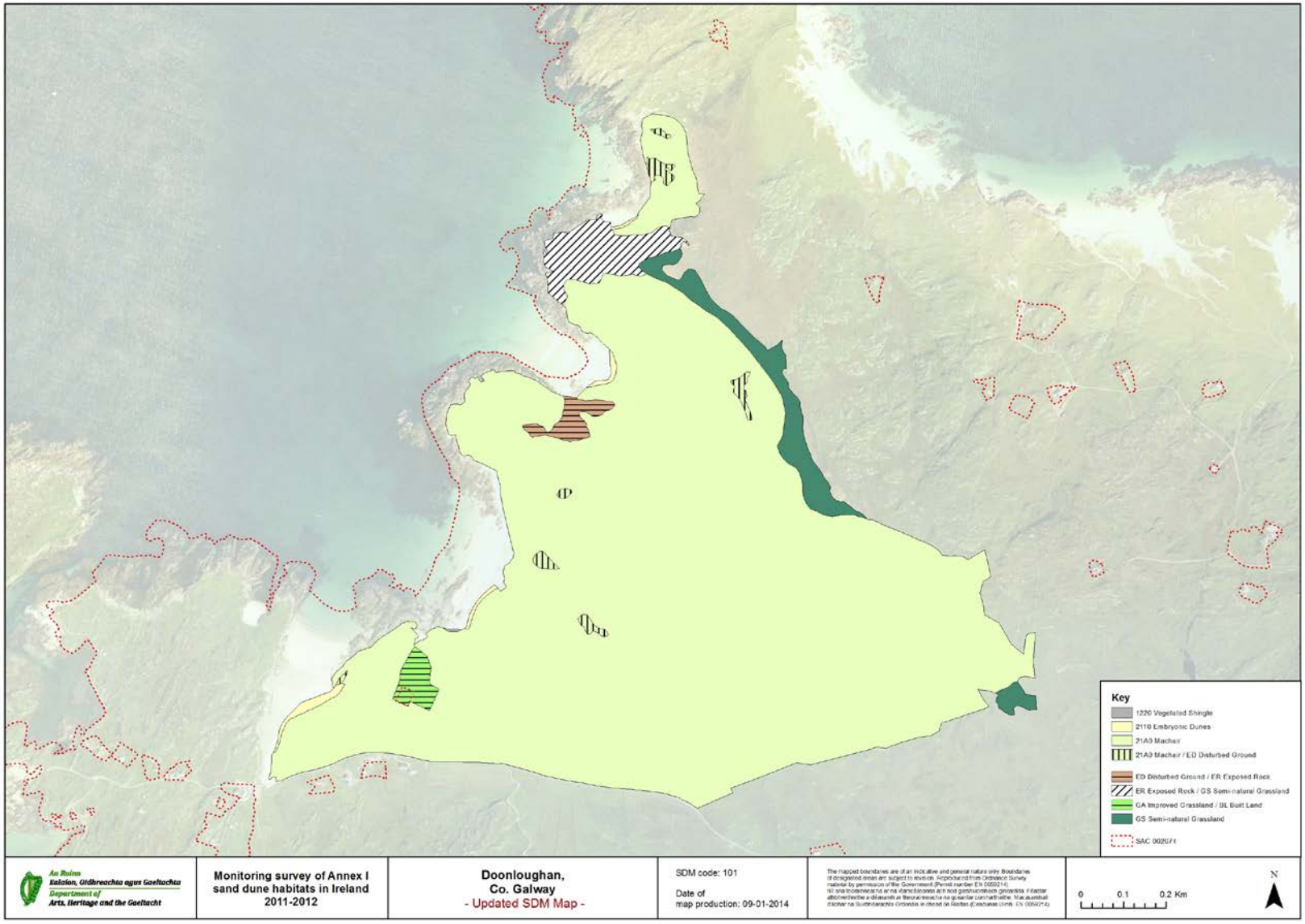
NPWS (2003) SAC site synopsis for SAC 002074 Slyne Head Peninsula. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. http://www.npws.ie/media/npwsie/content/images/protectedsites/sitesynopsis/SY002074.pdf. Accessed March 2013.

NPWS (2009) NPWS Conservation Statement. Slyne Head Peninsula SAC, site code 2074, Co. Galway. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin. http://www.npws.ie/media/npwsie/content/images/protectedsites/conservationstatement/CS002074.pdf. Accessed March 2013.

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.

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.


Key
1210 Strandline
1220 Vegetated Shingle
2110 Embryonic Dunes
21A0 Machair
BL Built Land
ER Exposed Rock
GS GS Semi-natural Grassland
LR Littoral Rock
SAC 002074
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Monitoring survey of Annex I sand dune habitats in Ireland 2011-2012
Doonloughan, Co. Galway
- Revised Baseline Habitat Map -
SDM code: 101
Date of map production: 09-01-2014
0 0.1 0.2 Km
N


Key
1220 Vegetated Shingle
2110 Embryonic Dunes
21A0 Machair
21A0 Machair / ED Disturbed Ground
ED Disturbed Ground / ER Exposed Rock
ER Exposed Rock / GS Semi-natural Grassland
GA Improved Grassland / BL Built Land
GS Semi-natural Grassland
SAC 002074
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Monitoring survey of Annex I sand dune habitats in Ireland 2011-2012
Doonloughan, Co. Galway
- Updated SDM Map -
SDM code: 101
Date of map production: 09-01-2014
0 0.1 0.2 Km
N