Ballyness Bay SAC (site code 1090)
Conservation objectives supporting document -coastal habitats

NPWS

Version 1

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Table of Contents

Please note that the opinions expressed in the site reports from the Coastal Monitoring Project (CMP) and the 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: Ballyness SAC 001090. 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.

Ballyness Bay is a large and very shallow coastal and marine complex, with extensive areas of sand flats that are exposed at low tide. It is situated in north-west Donegal, adjacent to the towns of Gortahork and Falcarragh. The underlying geology is mostly pelites with some smaller areas of limestone and quartzite. Most of the site is covered by windblown sand and peat. The bay receives the flows of three small to medium sized rivers – the Tullaghobeg River, the Glenna River and the Owenawillin River. The outer part of the bay is marked by two substantial sand dune systems at Dooey and Ballyness.

Dooey sand dunes (also sometimes referred to as Magheraroarty Dunes) are highly dynamic and have grown to a considerable height near the tip of the spit and they contain what is probably the largest unvegetated sand dune in the country. The succession of vegetation types across the spit and the topographical features make this area of special interest. Of particular importance are the fixed dunes, which occur the length of the Dooey sand spit. In contrast, the dunes at Ballyness are relatively low-lying, but they also have areas of fixed dune as well as sandy, machair-type grassland and dune slacks.

Ballyness Bay SAC (site code: 1090) is designated for a range of habitats including estuaries, mudflats and sandflats and sand dunes. The following four coastal habitats are included in the qualifying interests for the site (* denotes a priority habitat):

- Embryonic shifting dunes (2110)
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2120)
- Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)*
- Humid dune slacks (2190)

All four habitats are associated with sand dune systems and are found in close association with each other.

Perennial vegetation of stony banks, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM) were also recorded within the SAC during the Coastal Monitoring Project (CMP) (Ryle et al., 2009), and Saltmarsh Monitoring Project (SMP) (McCorry & Ryle, 2009), however, these habitats are not listed as a qualifying interest for this site. The saltmarsh at Dooey is listed on the

national inventory of saltmarsh sites (Curtis & Sheehy Skeffington, 1998). The National Shingle Beach Survey (NSBS) did not survey any sites in this SAC (Moore & Wilson, 1999).
The known distribution of sand dune habitats within Ballyness Bay is presented in Appendix I.

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

The targets set for the **sand dune habitats** are based primarily on the results of the Coastal Monitoring Project (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.

The CMP was a comprehensive national baseline survey of all known sand dune systems in Ireland. A total of two sub-sites were surveyed, mapped and assessed within Ballyness Bay SAC (Ryle *et al.*, 2009):

1. Ballyness
2. Dooey

As part of the Coastal Monitoring Project (CMP) detailed individual reports and habitat maps were produced for all sub-sites and those compiled for Ballyness are included in Appendix II.

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 Dooey) 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 Dooey are included in Appendix III.

Ballyness (or Drumatinny dunes as it is also known as) is composed of a long, slightly undulating fixed dune ridge, which is fronted by tall mobile dunes. Towards the western end of the beach there is an accreting tip with a number of tall, unvegetated mobile dunes. On the landward side of the fixed dunes is a more flat topography where extensive humid dune slacks occur. The land rises gently behind the dune slacks and there are areas of wet and dry grassland to the east. The long wide beach at Ballyness supports good examples of embryonic dunes and an unvegetated shingle bank towards the western end. Ballyness is grazed by sheep and cattle who are given supplementary feed. There is one small area in the middle of the site that is commonage (Ryle *et al.,* 2009).

The Dooey site formed on a sand spit, approximately 3km in length and is notable for what is thought to be the largest unvegetated dune in the country, which is located at the northern tip of the spit (Gaynor, 2008).

The conservation objectives for the sand dune habitats in Ballyness Bay 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 two sub-sites as surveyed by the CMP and SDM represent the total area of sand dunes within Ballyness Bay 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 objective will help to ensure that the habitat or species achieves favourable conservation status at a national level.

3 Sand dune habitats

Sand dunes are hills of wind-blown sand that have become progressively more stabilised by a cover of vegetation. In general, most sites display a progression through strandline, foredunes, mobile dunes and fixed dunes. Where the sandy substrate is decalcified, fixed dunes may give way to dune heath. Wet hollows, or dune slacks, occur where the dunes have been eroded down to the level of the water table. 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 (21A0) *

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

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.

Fixed dunes refers to the more stabilised area of dune systems, generally located in the shelter of the mobile dune ridges, where the wind speed is reduced and the vegetation is removed from the influence of tidal inundation and salt spray. This leads to the development of a more or less closed or 'fixed' carpet of vegetation dominated by a range of sand-binding species (Gaynor, 2008).

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

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 two sub-sites within Ballyness Bay SAC.:

1. Ballyness
2. Dooey

As part of the Coastal Monitoring Project (CMP) detailed individual reports and habitat maps were produced for all sub-sites and those compiled for Ballyness are included in a set of Appendices to this document (Appendix II). The updated site reports and habitat maps for Dooey from the Sand Dunes Monitoring Project (SDM) are included in Appendix III.

The combined data from the CMP for the sub-site at Ballyness, along with the data from the SDM for the sub-site at Dooey have been used to produce the habitat distribution map in Appendix II. This gives a total mapped area of 232.53ha of sand dune habitat within the Ballyness Bay SAC, of which 232.06ha is of qualifying interest.

3.1 Overall objectives

The overall objective for 'Embryonic shifting dunes' in Ballyness Bay SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Shifting dunes along the shoreline with *Ammophila arenaria*' in Ballyness Bay SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Fixed coastal dunes with herbaceous vegetation' in Ballyness Bay SAC is to 'restore the favourable conservation condition'.

The overall objective for 'humid dune slacks' in Ballyness Bay SAC is to 'maintain the favourable conservation condition'.

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

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. A baseline habitat map was produced for the sand dune habitats at each sub-site in Ballyness Bay SAC during the Coastal Monitoring Project (CMP) (Ryle *et al*., 2009). The map for Ballyness is included with the site report in Appendix II. The baseline habitat map produced by the CMP for Dooey was reviewed and updated during the Sand Dunes Monitoring Project (SDM) (Delaney *et al*., 2013) and the updated maps are included with the individual site reports in Appendix III. The data from the CMP and SDM has been combined to the produce the habitat distribution map presented in Appendix II.

The total areas of each sand dune habitat within the SAC are presented in the final column of the following table. These figures were subsequently checked and adjusted to take into account some overlapping polygons and mapping errors. The adjusted figures are presented in the final column.

Habitat	**Ballyness (CMP)**	**Dooey (SDM)**	**Total area (ha) of habitat within SAC boundary**
Embryonic shifting dunes	2.26	4.81	7.07
Shifting dunes along the shoreline with *Ammophila arenaria*	14.15	8.98	23.13
Fixed coastal dunes with herbaceous vegetation	90.95	97.04	187.99
Humid dune slacks	13.87	-	13.87
Total	**121.23**	**110.83**	**232.06**

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.

3.3 Range

3.3.1 Habitat distribution

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

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

3.4 Structure and Functions

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

3.4.1 Physical structure: functionality and sediment supply

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

Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Sediment supply is especially important in the embryonic dunes and mobile dunes, as well as the strandline communities where accumulation of organic matter in tidal litter is essential for trapping sand and initiating dune formation. The construction of physical barriers such as sea defences can interrupt longshore drift, leading to beach starvation and increased rates of erosion. Sediment circulation and erosion also has a role to play in the more stabilised dune habitats. Cycles of erosion

and stabilisation are part of a naturally functioning dune system, where the creation of new bare areas allows pioneer species and vegetation communities to develop, 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.

At Dooey, the extension of the pier and car park through reclamation from the sea is likely to have modified the marine currents which appears to be having an impact along the western side of the spit where the dune face is steep.

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

3.4.2 Physical structure: hydrological and flooding regime

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

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

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

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

3.4.3 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. Transitions to saltmarsh habitats occur at both Dooey and Ballyness.

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

3.4.4 Vegetation structure: bare ground

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

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

3.4.5 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.

3.4.6 Vegetation structure: vegetation height

This attribute applies to the fixed habitats (fixed dunes and dune slacks), where a varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds. The ecological benefits of moderate levels of grazing on dunes have been well

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

The fixed dunes to the seaward side of the Ballyness sub-site are high (10-20m) and as they are fenced off from large grazers, are dominated by marram (*Ammophila arenaria*). Elsewhere the fixed dune habitat is more typical where it is grazed by cattle, sheep and rabbits. In the southeast of the site, the absence of grazers has led to the development of a rank sward. There is also a large population of rabbits using the dunes and their burrowing action and overgrazing has led to erosion of the habitat. Although sheep, rabbits and cattle graze the slacks at Ballyness, the CMP did not note any damage to this habitat (Ryle *et al*., 2009).

The dunes at Dooey are subject to low intensity grazing by sheep and parts of the site are undergrazed (Delaney *et al.,* 2013).

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

3.4.7 Vegetation structure: vegetation cover

The only habitat where this is a specific attribute is humid dune slacks where the target is to maintain less than 40% cover of *S. repens.* This species forms a natural component of many dune slack communities in Ireland (Gaynor, 2008). However, high cover of this shrub can lower the level of the water table, causing the slacks to dry out. It can also form a dense canopy that shades out slack species leading to a reduction in biodiversity.

At the Ballyness sub-site, the dune slack habitat supports creeping willow (*Salix repens*) throughout the habitat, but in most areas it does not dominate (Ryle *et al.,* 2009).

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

3.4.8 Vegetation composition: typical species & sub-communities

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

Ballyness and Dooey support a characteristic dune flora, details of which can be found in the site reports in Appendices II & III.

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

3.4.9 Vegetation composition: negative indicator species

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

The main invasive species identified in Gaynor (2008) were 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.

The CMP recorded common ragwort (*Senecio jacobaea*) and creeping thistle (*Cirsium arvense*) as negative indicator species in the mobile dunes at Ballyness. Common ragwort (*Senecio jacobaea*), common nettle (*Urtica dioica*), creeping thistle (*Cirsium arvense*) and bramble (*Rubus fruticosus*) were frequent in the fixed dunes, while perennial rye grass (*Lolium perenne*) was occasional in the dune slacks (Ryle *et al.,* 2009).

Bracken (*Pteridium aquilinum*) was recorded occasionally, as well as common ragwort (*Senecio jacobaea*), creeping thistle (*Cirsium arvense*) in the dunes at Dooey.

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

3.4.10 Vegetation composition: scrub/trees

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

The target for this attribute therefore is that the cover of scrub and tree species should be under control or make up less than 5% of the vegetation cover.

4 References

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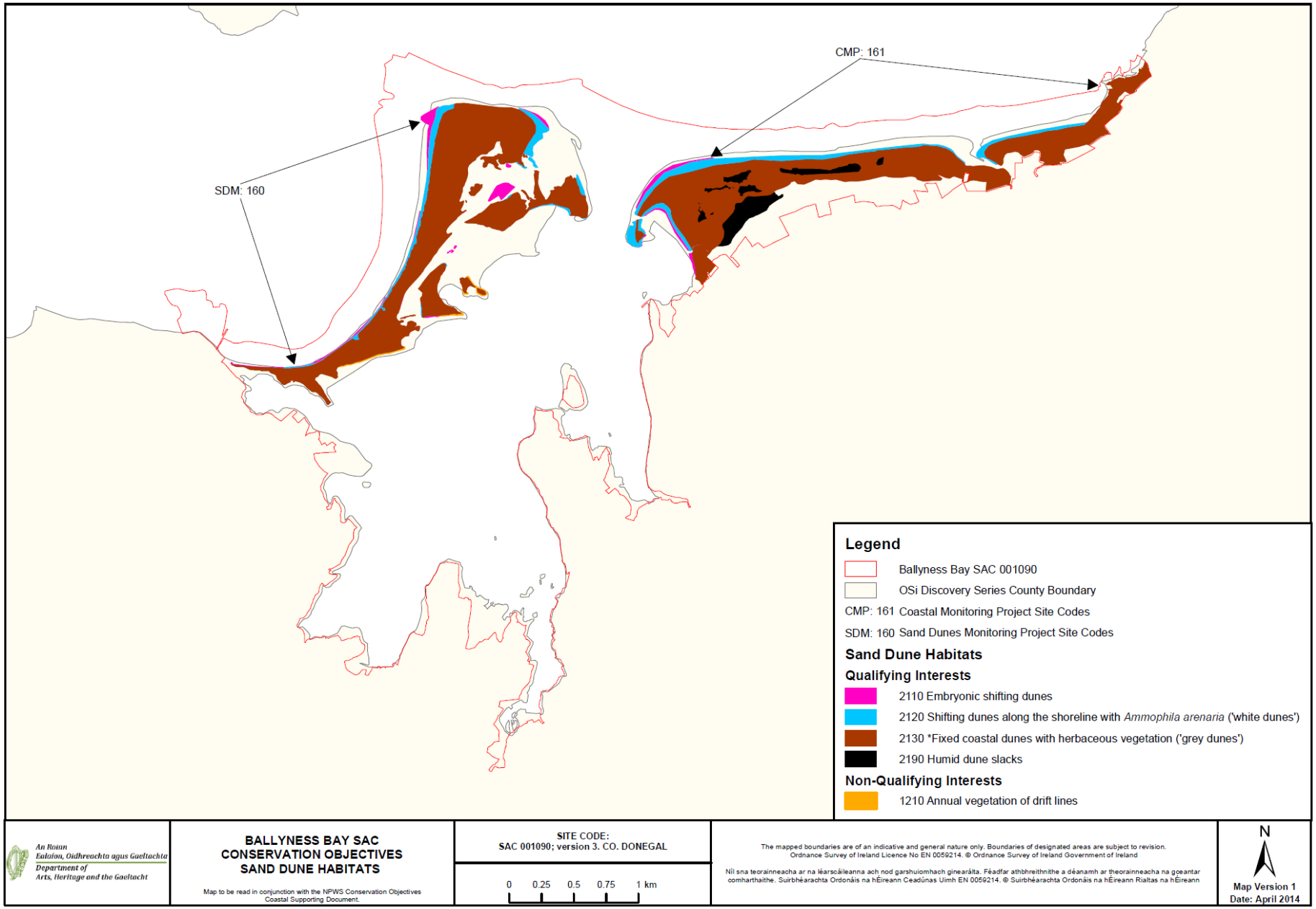
Appendix I – Distribution map of sand dune habitats within Ballyness Bay SAC.



Appendix II – Ballyness site report and habitat map from the CMP (Ryle *et al*., 2009)

SITE DETAILS

CMP06 site name: **Ballyness** CMP06 site code: **161** CMP Map No.: **158**

County:**Donegal** Discovery map: **1** Grid Reference: **B 925 345**

6 inch Map No.: **Dg 015 & 024& 025**

Aerial photographs (2000 series): **O 0094-D; O 0095-A, B, C, D; O 0096-A.**

NPWS Site Name: **Ballyness Bay**

NPWS designation: pNHA: **1090** cSAC: **1090**

Ranger Area: **West**

MPSU Plan: **Draft 2 Consultation 2005**

Report Author: **Melinda Swann**

SITE DESCRIPTION

Ballyness and Dooey are two dunes systems, which make up cSAC 1090 – Ballyness Bay. The cSAC has been designated as a result of the presence of a number of Annex I habitats listed in the European Habitats Directive including 'fixed dunes with herbaceous vegetation' (priority habitat), 'mud flats and sand flats', 'estuaries', 'shifting dunes along the shoreline with *Ammophilia arenaria'*, 'embryonic shifting dunes' and 'humid dune slacks'.

Ballyness (or as it is also referred to - Drumnatinny dunes) is located on the northwest coast of Co. Donegal, north of the town of Falcarragh and the village of Gortahork. Ballyness and Dooey Peninsula enclose a large bay, which at low tide exposes extensive mud flats and sand flats. The two systems are very dynamic as a result of considerable sand movement occurring due to wind and water action within the bay. This has led to a varied topography and a succession of dune types (MPSU, 2005). Ballyness is composed of a long, slightly undulating fixed dune ridge, which is fronted by tall mobile dunes. Towards the western end of the beach there is an accreting tip with a number of tall, unvegetated mobile dunes. On the landward side of the fixed dunes is a more flat topography where extensive humid dune slacks occur. The dune slacks provide feeding habitat for the Annex I species Greenland White-fronted Geese and Barnacle Geese, and roosting habitat for other waders and wildfowl, which frequent the area (see below). The land gently rises behind the dunes slacks and there are

areas of wet and dry grassland to the east. The beach at Ballyness is very long and wide and towards the western end of the beach are good examples of embryonic dunes and an unvegetated shingle bank.

The mud flats and sand flats within the bay are composed of a rich invertebrate fauna and there are several small Eelgrass beds found here. The cSAC is known to support approximately 42 different species of wader, wildfowl, seabird and birds of prey (Information from I-WEBS counts in MPSU management plan, 2005). Included in these are a number of Annex I species including *Gavia stellata* (Red-throated Diver), *Gavia immer* (Great Northern Diver), *Cygnus cygnus* (Whooper Swan), *Branta leucopsis* (Barnacle Goose), *Anser albifrons flavirostris* (Greenland White-fronted Goose), *Pluvialis apricaria* (Golden Plover), *Pyrrhocorax pyrrhocorax* (Chough), *Sterna sandvicensis* (Sandwich Tern), *Sterna albifrons* (Little Tern), *Falco peregrinus* (Peregrine) and *Falco columbarius* (Merlin). Furthermore during the current survey a kestrel (*Falco tinnunculus*) was seen on the site. Common Scoter (*Melanitta nigra*), which are listed as endangered in the Irish Red Data Book were also seen roosting in the bay. The Annex II mammal species *Phoca vitulina* (Common seal) and *Lutra lutra* (Otter) use the site along with the *Lepus timidus hibernicus* (Irish Hare), which is listed as 'Internationally Important' in the Irish Red Data Book. A fox (*Vulpes vulpes*) was seen at the site and rabbits (*Oryctolagus cuniculus*) are also widespread. At some locations adjacent to the site, meadow grassland is managed for *Crex crex* (Corncrake) as part of the Falcarragh to Meenlaragh Important Bird Area (IBA) for Corncrakes. Birdwatch Ireland has proposed several areas adjacent to the site for inclusion within the cSAC.

Ballyness is used for grazing of sheep and cattle and supplementary feeding is carried out. There is one small area in the middle of the site that is a commonage.

The extensive beach attracts many people to the area and there is a car park (outside the cSAC) located at the end of the main access road to the site. According to the MPSU management plan (2005) beach buggies and quad bikes are driven across the dunes and small scale dumping occurs throughout the site as well as some removal of sand from the beach.

The current survey concentrates on Annex I sand dune habitats found at Ballyness and include fixed dunes, humid dune slacks, mobile dunes and embryonic dunes. The areas of Annex I sand dune habitats recorded at Ballyness are shown in Table 161A.

Table 161A Areas of EU Annex I habitats mapped at Ballyness

EU Code	EU Habitat	Area (ha)
H2130	Fixed Dunes	91.1
H2190	Humid Dune Slacks	13.9
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	14.15
H2110	Embryonic Dunes	2.3
	Total Sand dune excluding developments/modifications*	**121.7**
	Total Sand dune including developments/modifications	**123**

*Development/modifications include car park (0.246ha) (outside cSAC) and improved field (1.469ha) (inside cSAC)

Fixed Dunes (H2130)

The fixed dune habitat comprises 91.1ha (approximately 75%) of the total sand dune habitat at Ballyness (Table 161A). The fixed dunes are a substantial size at Ballyness and are composed of a long ridge, which grades into a mosaic of flat dune grassland and dune slacks to the south. The dunes to the seaward side of the site are quite tall, approximately 10-20m and are mainly dominated by *Ammophila arenaria* (Marram grass) as they are fenced off from large grazers. The fixed dune grassland behind is in places a characteristic *Festuca rubra- Galium verum* community and is grazed by cattle, sheep and rabbits. However the majority of the habitat is composed of fenced fields, which are dominated by an abundance of *Ammophila arenaria* and agricultural weeds. In fact the habitat has been severely affected by agricultural practices as, in some areas agricultural weeds such as *Senecio jacobaea* and *Cirsium* spp. are the only species as far as the eye can see. In some areas, especially in the southeast of the site no grazers were present in the fields and therefore the sward here is rank. There is also a major threat to the structure of the habitat as there is an extremely large population of rabbits utilising the dunes. Their burrowing action and overgrazing has led to erosion of the surface of the habitat. There were also areas where the ground was very compacted and there were ring feeders noted and agricultural improvement may have occurred in the past.

In the eastern part of the habitat, east of the river, the fixed dunes were also dominated by negative indicator species and there were a number of ring feeders seen here also, with agricultural weeds concentrated nearby. Rabbits also graze this part of the habitat. Overall the fixed dune habitat has been very disturbed by agricultural practices and by the large rabbit population and has badly declined in condition.

The typical species found in the fixed dune at Ballyness include *Carex flacca* (Glaucous sedge), *Festuca rubra* (Red fescue), *Lotus corniculatus* (Common bird's-foot trefoil), *Galium*

verum (Lady's bedstraw), *Plantago lanceolata* (Ribwort plantain), *Thymus polytrichus* (Wild thyme), *Carex arenaria* (Sand sedge), *Euphrasia officinalis* agg. (Eyebright), *Prunella vulgaris* (Selfheal), *Campanula rotundifolia* (Harebell), *Viola tricolor* Ssp. *curtisii* (Wild pansy), *Veronica chamaedrys* (Germander speedwell), *Sedum acre* (Biting stonecrop), *Hypochaeris radicata* (Cat's ear), *Peltigera* spp. (*Peltigera* lichen), *Luzula campestris* (Field wood-rush), *Pilosella officinarum* (Mouse-ear-hawkweed), *Trifolium repens* (White clover), *Cerastium fontanum* (Common mouse-ear), *Rhinanthus minor* (Yellow-rattle), *Linum catharticum* (Fairy flax) and *Arrhenatherum elatius* (False oat-grass).

Other species found in the fixed dune include *Ammophila arenaria* (Marram grass), *Ranunculus repens* (Creeping buttercup), *Bellis perennis* (Daisy), *Achillea millefolium* (Yarrow), *Heracleum sphondylium* (Hogweed), *Poa annua* (Annual meadow-grass), *Centaurea nigra* (Common Knapweed), *Ranunculus acris* (Meadow buttercup), *Succisa pratensis* (Devil's-bit scabious), *Angelica sylvestris* (Wild angelica), *Rumex acetosella* (Sheep's sorrel), *Taraxacum agg.* (Dandelion), *Rosa pimpinellifolia* (Burnet rose), *Holcus lanatus* (Yorkshire fog) and *Anacamptis pyramidalis* (Pyramidal orchid).

Mosses found in the fixed dune habitat include *Rhytidiadelphus squarrosus, Calliergonella cuspidata, Homalothecium* spp., *Climacium dendroides, Tortula ruraliformis* and *Hypnum jutlandicum.*

The negative indicators include *Senecio jacobaea* (Common ragwort), which was abundant as well as *Urtica dioica* (Common nettle), *Cirsium arvense* (Creeping thistle), *Rubus fruticosus* (Bramble) and *Chamomilla suaveolens* (Pineappleweed).

Dune Slack (H2190)

The dune slack habitat comprises 13.9ha (approximately 11.4%) of the total sand dune habitat at Ballyness (Table 161A). There are very good examples of this habitat at Ballyness. The flat fixed dune grassland forms a mosaic with dune slacks. The slacks are floristically rich in species with *Salix repens* (Creeping willow) extending throughout the habitat, but in most cases it does not dominate. There are a number of small wet slacks to the seaward side, which are intermingled with low fixed dune hummocks. Larger wet slacks are located in the middle of the site and there is a very large slack, which extends to the base of the hill in the south. Although sheep graze the slacks, as well as rabbits and cattle, the habitat does not

seem to be too damaged and there were no significant amounts of negative indicators found. In fact no agricultural weeds were recorded in any of the slacks at Ballyness. The slacks are concentrated in the western part of the site, where the agricultural weeds are less prevalent. Some of the slacks are also fenced, which may be helping in their preservation, however if no grazing occurs their condition will decline in the future.

The typical species found in the dune slacks at Ballyness include *Mentha aquatica* (Water mint), *Ranunculus flammula* (Lesser spearwort), *Trifolium repens* (White clover), *Lotus corniculatus* (Common bird's-foot trefoil), *Prunella vulgaris* (Selfheal), *Carex arenaria* (Sand sedge), *Salix repens* (Creeping willow), *Potentilla anserina* (Silverweed), *Hydrocotyle vulgaris* (Marsh pennywort), *Holcus lanatus* (Yorkshire-fog), *Carex nigra* (Common sedge), *Equisetum* spp. (Horsetail), *Galium palustre* (Common marsh-bedstraw), *Carex flacca* (Glaucous sedge), *Euphrasia officinalis agg.* (Eyebright), *Campanula rotundifolia* (Harebell), *Viola* spp. (Pansy spp.), *Viola riviniana* (Common dog-violet), *Linum catharticum* (Fairy flax), *Juncus articulatus* (Jointed rush) and *Juncus acutus* (Sharp rush).

Other species present include *Parnassia palustris* (Grass-of-parnassus), *Ranunculus bulbosus* (Bulbous buttercup), *Eleocharis quinqueflora* (Few-flowered spike-rush), *Lythrum salicaria* (Purple-loosestrife), *Ophioglossum vulgatum* (Adder's-tongue) *Agrostis stolonifera* (Common bent), *Filipendula ulmaria* (Meadowsweet), *Ranunculus repens* (Creeping Buttercup), and the typical moss *Calliergonella cuspidata.*

The negative indicator *Lolium perenne* (Perennial rye-grass) was recorded in the habitat but was not abundant.

Mobile Dunes (H2120)

The habitat comprises 14.15ha (approximately 11.6%) of the total sand dune habitat at Ballyness (Table 161A). The mobile dunes form a tall ridge, which can reach heights of 20 metres in places. In the western part of the site, there is an accreting tip where high mobile dunes have formed. There is a breach in the dunes at the tip, and a small island of fixed surrounded by mobile dunes has been left. South of the tip the mobile dunes are not as tall and peter out towards the inner bay where they are replaced by a low ridge of embryonic dunes. The mobile dunes continue along the main beach and are mostly intact, although they are more discontinuous towards the main access point to the beach. Here there is a river,

which probably changes course from time to time and may erode the mobile dunes here, as there is an eroded fixed dune face on the western side of the river. The dunes are quite tall and steep here also, making them relatively inaccessible, therefore this discourages tourists from climbing. The mobile dunes in the far east of the beach are slightly less intact and there is some brown *Ammophila arenaria*. However this area is probably affected by natural erosion as it is beside a rocky headland and is a natural feature of the habitat in this case. The mobile dunes at Ballyness are an important feature of the site.

The mobile dunes are composed of typical species *Ammophila arenaria* (Marram grass) as well as other species such as *Tussilago farfara* (Colt's-foot), *Peltigera* spp. (*Peltigera* lichen), *Calystegia soldanella* (Sea bindweed), *Festuca rubra* (Red fescue), *Taraxacum agg.* (Dandelion) and some *Elytrigia juncea* (Sand couch) in places.

The negative indicators *Senecio jacobaea* (Common ragwort), which was flowering and *Cirsium arvense* (Creeping thistle) were recorded in one area of the habitat.

Embryonic Dunes (H2110)

The habitat comprises 2.3ha (approximately 1.9%) of the total sand dune habitat at Ballyness (Table 161A). The embryonic dunes are mainly confined to the western end of the beach near the accreting tip, where extensive areas of the habitat occur. There is also a long, low ridge composed of *Elytrigia juncea* at the inner part of the bay, south of the accreting tip. The habitat is healthy and there is very little disturbance in this area of the site. There are some patches of the habitat scattered along the beach also, but there seems to have been recent erosion of the front of the foredunes as there are some places that are eroded back to a steep mobile face. The embryonic dunes are absent from the eastern end of the beach altogether and there is mostly a steep mobile dune ridge here also. There seems to be a general re-working of the sediment from the eastern end of the site to the western end, which is a natural process as there is a rocky headland in this part of the site.

The dominant species of the embryonic dunes is *Elytrigia juncea* (Sand couch) with *Leymus arenarius* (Lyme grass) also present. Some *Ammophila arenaria* (Marram grass) and *Carex arenaria* (Sand sedge) are found in the places in the habitat. The *E. juncea* (Sand couch) was healthy with extensive flowering and fruiting and there was some *Senecio jacobaea* (Common ragwort) recorded in the habitat but was not widespread.

IMPACTS

The main threats to the site are agricultural practices and overgrazing by rabbits as well as some recreation. The current impacts on the sand dune habitats are given in Table 161B. There is a tarmacadam car park (Code 490) located in the fixed dunes, which is outside the cSAC. Overgrazing by rabbits (Code 146) was evident in the fixed dunes and there are hundreds of burrows undermining the structure. Some cattle and high numbers of sheep (Code 140) also graze the fixed dunes. There are a number of ring feeders (Code 171) found in the habitat and agricultural weeds (Code 971) dominate much of the fixed dunes. Poached (Code 720) bare areas are found near the ring feeders and the ground is quite compacted in places. The fixed dunes have been fenced (Code 150) and so the grazers do not have access to all areas and therefore some places are undergrazed (Code 149) and rank. An abundance of *S. jacobaea* and *Cirsium* spp., indicates past supplementary feed and disturbance. Towards the seaward side grazers do not have access and so the fixed dunes are dominated by *A. arenaria*. There are also some blowouts (Code 900) but these are a natural part of the system. However, there is some erosion at the site that seems to be exacerbated by the rabbits. There is also some erosion along the front line in places, but these areas are not extensive and *A. arenaria* is recolonising a previously eroded face.

The dune slacks are lightly grazed by sheep and rabbits (Code 140), and are mostly fenced (Code 150) therefore they are relatively undisturbed.

The mobile dune is affected by natural erosion (Code 900), but at present it is not too significant. There seems to be a general re-working of the sand within the system. Some walking (Code 622) and trampling (Code 720) may affect the habitat but the mobile dunes are quite high and therefore not very accessible. Recreation levels are not excessive at the site and visitors tend to stay on the beach, as the dunes are so high. Some trampling of the mobile dunes probably occurs near the main access point to the beach.

The embryonic dunes are found mainly at the accreting end of the beach and are relatively undisturbed. Some walking (Code 622) and trampling (Code 720) probably occurs but it does not seem to be having an obvious negative impact at present. The habitat will be prone to natural erosion (Code 900), especially in the winter months.

Table 161B Intensity and impact of various activities on sand dune habitats at Ballyness

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H2130	140	B	+2	35	Inside
H2130	143	A	-1	1	Inside
H2130	149	A	-1	56	Inside
H2130	150	A	-1	Unknown	Inside
H2130	171	A	-1	0.5	Inside
H2130	490	A	-1	0.246	Outside
H2130	720	B	-1	0.5	Inside
H2130	900	A	0	0.1	Inside
H2130	971	B	-1	70	Inside
H2190	140	B	+2	10	Inside
H2190	150	B	-1	Unknown	Inside
H1220	622	C	-1	Unknown	Inside
H1220	720	B	-1	0.1	Inside
H1220	900	C	0	Unknown	Inside
H2110	622	C	-1	Unknown	Inside
H2110	720	C	-1	Unknown	Inside
H2110	900	C	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 the cSAC and directly impacting the sand dune habitat. Outside = activities recorded outside the cSAC but adjacent to sand dune habitat that may be impacting the sand dune habitat

CONSERVATION STATUS

The conservation status of a site is assessed on the condition of the site with regards to extent, structure & functions and future prospects (Table 161C). The main source of baseline information for this site was from the ASI Survey (1994 & 1995), the NATURA 2000 report (1999) and the MPSU management plan (2005).

Table 161C Conservation status of Annex I sand dune habitats at Ballyness

Habitat[1]	EU Conservation Status Assessment				
	Favourable	**Unfavourable - Inadequate**	**Unfavourable – Bad**	**Overall EU conservation status assessment**	**Proposed Irish conservation status system**[2]
Fixed Dune (H2130)		Extent Future Prospects	Structure & functions	**Unfavourable - Bad**	Unfavourable - Declining
Humid Dune Slack (H2190)	Extent Structure & functions Future Prospects			**Favourable**	Favourable-Maintained
Mobile Dunes (H2120)	Extent Structure & functions Future Prospects			**Favourable**	Favourable-Maintained
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)

Details of the numbers and pass/failure rates of monitoring stops used to assess habitat structure & functions at Ballyness are shown in Table 161D.

Table 161D Pass/fail results of Annex I sand dune habitats at Ballyness

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Fixed Dunes (H2130)	6	6	**Unfavourable- Bad**
Humid Dune Slack (H2190)	5	0	**Favourable**
Mobile dunes (H2120)	9	0	**Favourable**
Embryonic Dunes (H2110)	4	0	**Favourable**

Fixed Dunes (H2130)

The fixed dunes are extensive at this site and there is no development within the cSAC, however the extent of the habitat is rated as *unfavourable-inadequate* due to some overgrazing by rabbits, which has led to a small loss in area of the habitat. The NATURA 2000 survey ranks the fixed dunes as *excellent representavitity*.

The structure and functions parameter is rated as *unfavourable-bad*. A total of twelve monitoring stops were placed in the fixed dunes. Six passed their targets and six failed (Table 161D). The monitoring stops failed as a result of a combination of high percentage cover of negative indicator species, low typical species composition, cover of bare ground and sward height. There are a high number of ring feeders present in the habitat and there are extremely high numbers of rabbits throughout the habitat and the burrows have significantly altered the structure of the fixed dunes. There are bare areas and some overgrazing has occurred. The NATURA 2000 survey gives a ranking of *structure well conserved* for the fixed dunes.

The future prospects of the fixed dune at Ballyness are rated as *unfavourable-inadequate*. This assessment is based on the threat of encroachment of agricultural weeds and the presence of rabbits, which will further alter the condition of the habitat if they are not controlled. The fixed dunes at Ballyness are an excellent example of this habitat and orchids are found throughout and are therefore a feature of local distinctiveness. The NATURA 2000 survey gave a ranking of *good prospects* for the fixed dunes at Ballyness. The MPSU management plan states that one of its objectives is to maintain the Annex I habitats within the cSAC using the following strategies: *implementing sustainable grazing practices; increasing control of damaging activities including supplementary feeding, dumping and littering; monitoring potentially damaging activities on all the habitats and the status of notable plant an animal species; liase with various organisations and groups regarding the management of the site.* The implementation of this plan is therefore a necessity at this site if the fixed dunes are to meet a favourable conservation status in the future.

An overall EU conservation status of *unfavourable-bad* is assigned to the fixed dune (Table 161C). This is attributable to the *unfavourable-bad* structure and functions of the habitat as a whole at this site.
The overall Irish conservation status is *unfavourable-declining*.

Humid Dune Slack (H2190)

There are very good examples of extensive areas of dune slacks present at this site. There is nothing to indicate that there has been a decline in area. Therefore the extent of the dune slack is rated as *favourable*. The NATURA 2000 survey assessed the dune slacks as *good representativity*.

Five monitoring stops were placed in the habitat and all passed the monitoring criteria. The habitat is functioning well and is at present intact with no major impacts, except for some light sheep, cattle and rabbit grazing. The fencing that has been carried out, (possibly to prevent cattle entering the slacks in winter, if they are waterlogged) has maintained the habitat. Therefore a conservation rating of *favourable* is given for structure and functions of the dune slack. The NATURA 2000 survey ranked the structure of the dune slacks as *structure well conserved.*

As the dune slack habitat is mostly undisturbed at Ballyness and is lightly grazed its future prospects are rated as *favourable.* The slacks are extensive at this site and are therefore a feature of local distinctiveness for the site and should be managed carefully according to the strategies set out in the MPSU management plan for the cSAC. The NATURA 2000 survey gives a ranking of *good future prospects* for the dune slacks at Ballyness.

An overall EU conservation assessment of *favourable* is assigned to the dune slack habitat. The overall Irish rating is *favourable-maintained.*

Mobile Dunes (H2120)

The extent of the mobile dunes at the site is considered to be *favourable*. Some natural erosion is occurring in places but this is not considered a negative impact. There may be some removal of the habitat near the car park as the river changes course during the winter months but again this is the natural dynamic nature of the system. The NATURA 2000 form ranks the mobile dunes as *good representativity.*

The mobile dunes at Ballyness are of good quality and there is sand accretion at the western end of the beach where a sandy spit is developing. There is plenty of healthy, green *Ammophila arenaria* (Marram grass) in the habitat overall (some brown Marram grass is present at the very eastern end of the beach but this is probably natural as the area may be

eroding here). Nine monitoring stops were placed in the habitat and all passed the monitoring criteria. Therefore an assessment of *favourable* is given to the mobile dunes at Ballyness. The NATURA 2000 form ranks the structure of the mobile dunes at this site as *structure well conserved.*

The future prospects of the habitat are rated as *favourable* as the habitat is mainly intact, with a re-working of the sand occurring leading to accretion of the mobile dunes. The NATURA 2000 survey ranks the mobile dunes as having *good prospects.*

The overall EU assessment is rated as *favourable* for the habitat. The overall Irish assessment is *favourable-maintained.*

Embryonic dunes (H2110)

Embryonic dunes are apparent at the western end in front of the accreting tip and are intact. The extent of the habitat is rated as *favourable*. The NATURA 2000 ranking for the embryonic dunes is *good representativity*.

Four monitoring stops were placed in the embryonic dunes and all passed. Therefore the structure and functions parameter is rated as *favourable* for the habitat. Healthy *Elytrigia juncea* (Sand couch) was present with plenty of flowering and fruiting and no negative indicators were recorded. The NATURA 2000 survey gave a ranking of *structure well conserved* for the embryonic dunes at this site.

The future prospects for the embryonic dunes are rated as *favourable*. The NATURA 2000 survey gives a ranking of *good future prospects*.

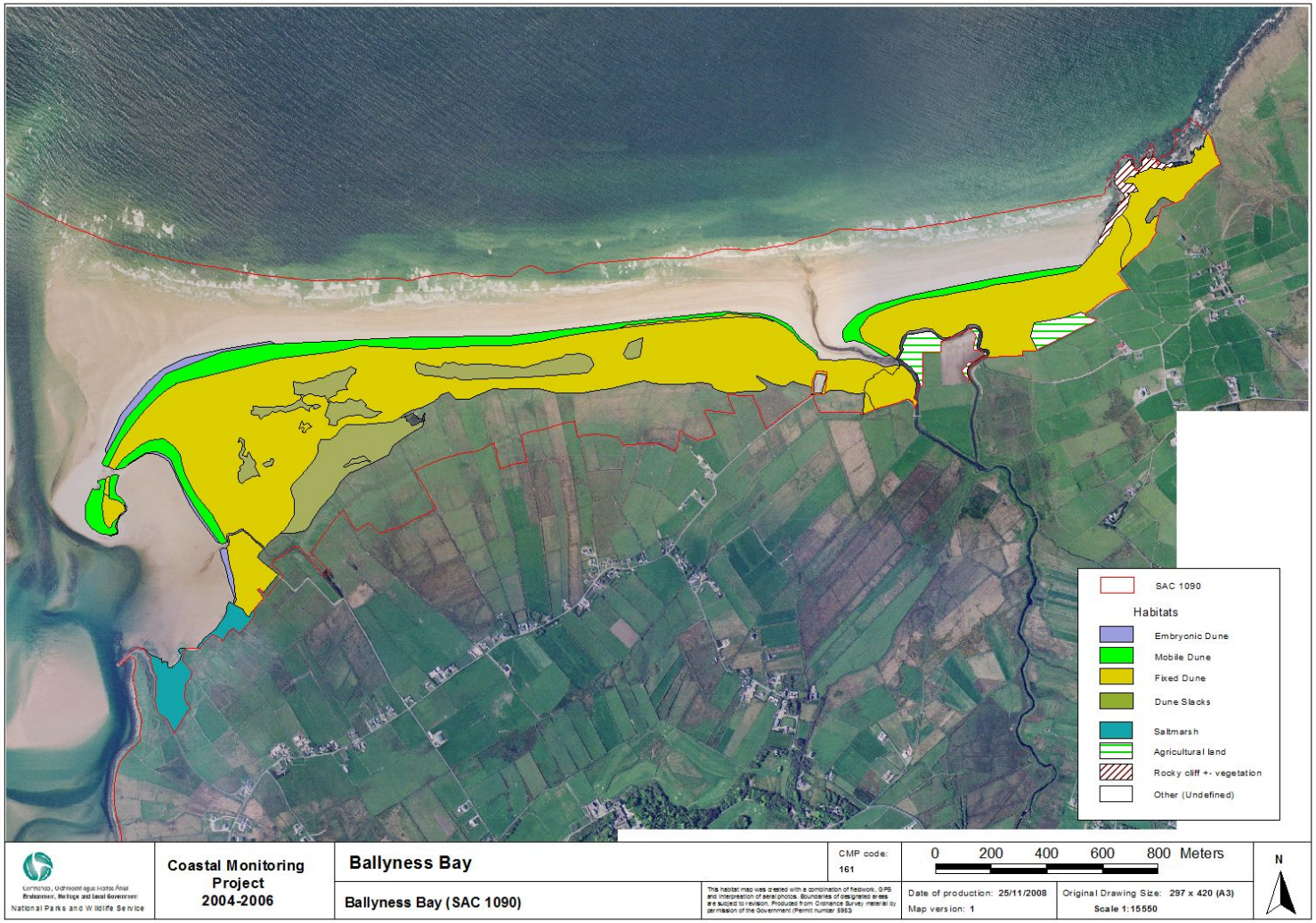
The overall EU conservation assessment is rated as *favourable,* while the Irish conservation assessment is *favourable-maintained*.

The following has been taken directly from the explanatory notes accompanying the NATURA 2000 form for the cSAC.

- Note on possible occurrence of Machair (21AO) at Ballyness

A small area of dry 'machair' –type grassland is described in the NHA return, as being found on gently sloping ground behind the dunes at Drumnatinney. The site is highly calcareous in nature and subject to frequent high winds and rain. The topography is described as machair-like. It is also heavily grazed. The species noted include *Festuca rubra, Bellis perennis, Hieracium pilosella, Primula vulgaris* and *Armeria maritima*. With the exception of *Festuca rubra* and *Bellis perennis* these are not typical machair species. This site is not listed as containing machair in Curtis (1991a), Bassett (1983) or Bassett & Curtis (1985). The occurrence of machair at this site needs to be investigated further and is not assessed at present.

- During the current survey (Coastal Monitoring Project, 2006) extensive investigation at this site was not possible on the day of survey due to access difficulties (and the presence of a bull). A visual assessment noted that the grassland, which extended up the hill at the back of the site, might have the characteristics of a machair habitat, but no species list was taken and therefore no assessment can be made as to the definite presence of the habitat. In agreement with the above paragraph taken from the NATURA 2000 survey, it is felt that more study is needed at this site.


SAC 1090
Habitats
Embryonic Dune
Mobile Dune
Fixed Dune
Dune Slacks
Saltmarsh
Agricultural land
Rocky cliff +- vegetation
Other (Undefined)
Coastal Monitoring Project 2004-2006
Ballyness Bay
CMP code: 161
0 200 400 600 800 Meters
N
Ballyness Bay (SAC 1090)
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 5993)
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:15550
National Parks and Wildlife Service

Appendix III – Dooey site report and habitat map from the Sand Dunes Monitoring Project (Delaney *et al*., 2013)

SITE 160 DOOEY

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

Dooey is a large site located approximately 4 km north-west of Falcarragh, Co. Donegal. It is a large sand spit which is growing in a north-eastern direction, and due to this, has nearly enclosed all of Ballyness Bay. The site forms part of the Ballyness Bay SAC (SAC 001090). Four Annex I sand dune habitats (* indicates a priority habitat) were recorded here during the CMP: **1220 Perennial vegetation of stony banks, 2110 Embryonic shifting dunes, 2120 Marram dunes (white dunes)** and ***2130 Fixed dunes (grey dunes)** (Ryle *et al*., 2009). Other Annex I habitats that are associated with the sand dunes at Dooey include **1130 Estuaries** and **1140 Mudflats and sandflats not covered by seawater at low tide.** Dooey has a very notable feature, a large unvegetated dune, found at the northern tip of the site. This is believed to be the largest in the country (Ryle *et al.*, 2009). No notable plants were found during the CMP or SDM, but the presence of the Annex I bird species, Chough, was recorded during the SDM. The main land-use for the site is as an amenity. There is a large car park and café at the southern end of the site to facilitate the ferry to Tory Island, but cars park on the flat areas within the ***2130 Fixed dunes (grey dunes)** as well. It is a very popular site with tourists and locals. The site is also used as pasture and is largely held as commonage (Ryle *et al.*, 2009).

2 CONSERVATION ASSESSMENTS

2.1 Overview

Dooey was surveyed on the 8th, 9th and 30th of September and also on the 1st October 2011. Of the four Annex I habitats recorded on the site during the baseline survey, three were recorded in 2011. **1220 Perennial vegetation of stony banks** was no longer present, but **1210 Annual vegetation of drift lines,** previously unrecorded during the CMP, was recorded in 2011. The habitats found at Dooey in 2011 and the results of the conservation assessments are presented in Table 1. ***2130 Fixed dunes (grey dunes)** were assessed as Unfavourable-Inadequate, while the other three habitats were assessed as Favourable.

Table 1. Conservation assessment results for all Annex I dune habitats surveyed at Dooey, Co. Donegal.

Habitat	Area	Structure & Functions	Future Prospects	Overall result
1210 Annual vegetation of drift lines	Favourable	Favourable	Favourable	Favourable
2110 Embryonic shifting dunes	Favourable (stable)	Favourable (stable)	Favourable (stable)	Favourable (stable)
2120 Marram dunes (white dunes)	Favourable (stable)	Favourable (stable)	Favourable (stable)	Favourable (stable)
*2130 Fixed dunes (grey dunes)	Favourable (stable)	Unfavourable -Inadequate (stable)	Unfavourable -Inadequate (stable)	Unfavourable -Inadequate (stable)

2.1.1 Area

The areas of Annex I sand dune habitats at Dooey according to the baseline maps, the revised baseline maps and the Sand Dunes Monitoring Project are presented in Table 2. **1210 Annual vegetation of drift lines** was not recorded during the baseline survey, but was present in 2011. It is possible that **1210 Annual vegetation of drift lines** may have been interpreted as **1220 Perennial vegetation of stony banks** during the CMP as some of the species recorded during the baseline survey are characteristic of both. There is not enough evidence to be sure of this however. Small alterations were made to the baseline areas **2110 Embryonic shifting dunes**, **2120 Marram dunes (white dunes)** and ***2130 Fixed dunes (grey dunes)** after they were visited in 2011 to account for features which could be seen on the 2005 aerial photographs and were probably present during the CMP survey in 2006. The site has increased in size since the baseline survey because of accretion and succession.

Table 2. Areas of Annex I dune habitats originally mapped at Dooey 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	0.00	0.00	0.52
1220 Perennial vegetation of stony banks	0.37	0.37	0.00
2110 Embryonic shifting dunes	4.80	4.79	4.81
2120 Marram dunes (white dunes)	10.50	10.55	8.98
*2130 Fixed dunes (grey dunes)	94.83	94.87	97.04
Total	110.50	110.58	111.35

2.1.2 Structure and Functions

Structure and Functions were assessed for four habitats at Dooey. Table 3 shows how many monitoring stops were placed in each habitat, number of criteria assessed and how many of the criteria failed the assessment. All of the criteria in the Structure and Functions assessment passed for **1210 Annual vegetation of drift lines, 2110 Embryonic shifting dunes** and **2120 Marram dunes (white dunes).** A single criterion failed the Structure and Functions assessment for ***2130 Fixed dunes (grey dunes),** therefore causing this habitat to have Unfavourable-Inadequate Structure and Functions**.**

Table 3. Annex I sand dune habitats at Dooey 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	4	6	0
2110 Embryonic shifting dunes	8	7	0
2120 Marram dunes (white dunes)	8	7	0
*2130 Fixed dunes (grey dunes)	12	11	1

2.1.3 Future Prospects

Impacts and activities recorded at Dooey are presented in Table 4. Impact codes are assigned according to Ssymank (2010). The only negative impact recorded for both **2110 Embryonic shifting dunes** and **2120 Marram dunes (white dunes)** was the presence of the nearby pier, while rock armour was a neutral impact for all four habitats. ***2130 Fixed dunes (grey dunes)** had the most impacts recorded, with most either related to agriculture (such as grazing levels, sheep pens, fencing) or to recreation and amenity use (car park, camping, trampling, litter, campfires). Trampling was the most serious negative impact for the habitat, while non-intensive sheep grazing was the most positive.

Table 4. Impacts recorded in Annex I sand dune habitats at Dooey 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	J02.12.01	Rock armour	-	Neutral	0	Outside
2110	D03.01.02	Pier	Low	Negative	1	Outside
2110	G01.02	Walking	Low	Neutral	1	Inside
2110	J02.12.01	Rock armour	High	Neutral	1	Outside
2110	K01.01	Erosion	Medium	Neutral	10	Inside
2120	D03.01.02	Pier	Low	Negative	1	Outside
2120	G01.02	Walking	Low	Neutral	1	Inside
2120	J02.12.01	Rock armour	High	Neutral	1	Outside
2120	K01.01	Erosion	Medium	Neutral	10	Inside
*2130	A04.02.02	Non intensive sheep grazing	Low	Positive	80	Inside
*2130	A04.03	Lack of grazing	Medium	Neutral	20	Inside
*2130	D01.01	Paths and tracks	High	Negative	1	Inside
*2130	D01.03	Car park	Medium	Neutral	1	Outside
*2130	E04.01	Sheep pen	High	Negative	1	Inside
*2130	G01.02	Walking	Medium	Neutral	20	Inside
*2130	G01.03.02	Off-road driving	High	Negative	1	Inside
*2130	G02.07	Sports pitch	Low	Negative	1	Inside
*2130	G05	Campfires	High	Negative	1	Inside
*2130	G05.01	Trampling	High	Negative	5	Inside
*2130	G05.09	Fencing	Low	Neutral	1	Inside
*2130	H05.01	Litter	Low	Negative	1	Inside
*2130	J02.12.01	Rock armour	-	Neutral	0	Outside
*2130	K01.01	Erosion	Medium	Neutral	10	Inside
*2130	K04.05	Rabbit grazing	Medium	Positive	5	Inside

2.2 Annex I habitat assessments

The conservation status of the Annex I habitats at Dooey 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

This habitat was found on the more sheltered, eastern side of Dooey. It comprised a narrow band of vegetation on cobble, and decaying organic matter was plentiful on the day of survey.

There was no record of this habitat during the CMP, but **1220 Perennial vegetation of stony banks** was found close to where the **1210 Annual vegetation of drift lines** was mapped during the SDM, and the two habitats overlap. It may be the case that the **1210 Annual vegetation of drift lines** mapped in 2011 represents a reclassification of the same habitat found during the baseline survey when it was mapped as **1220 Perennial vegetation of stony banks.** No trends could be established for this habitat.

Area

This habitat was not recorded during the baseline survey, while 0.52 ha were recorded in 2011. If the **1220 Perennial vegetation of stony banks** recorded during the CMP was the same habitat, then it has expanded from 0.37 ha. There is no reason to believe that any of the habitat was lost due to human activities. Area was assessed as Favourable during the SDM.

Structure and Functions

All of the criteria passed in the Structure and Functions assessment. Structure and Functions were assessed as Favourable during the SDM.

Future Prospects

Rock armour, with a neutral effect, was the only impact recorded for this habitat. Future Prospects were assessed as Favourable during the SDM.

Conservation assessment

All of the parameters were assessed as Favourable. The conservation assessment of **1210 Annual vegetation of drift lines** was assessed as Favourable during the SDM.

2.2.2 1220 Perennial vegetation of stony banks

This habitat was not recorded for Dooey during the SDM. The habitat recorded as **1220 Perennial vegetation of stony banks** during the CMP may have been reclassified as **1210 Annual vegetation of drift lines**, but there is not enough evidence from the data available to be certain that this was the case. There is no indication that the loss of the habitat was related to human activities.

2.2.3 2110 Embryonic shifting dunes

2110 Embryonic shifting dunes are widely distributed around the coastline at Dooey. They are present both as a linear habitat and as more extensive polygons. In the sheltered, eastern area, they are present as very low hummocks sparsely vegetated with *Elytrigia juncea*. These parts of the habitat form islands at high tide and may occasionally be submerged.

Area

The area of **2110 Embryonic shifting dunes** increased from 4.79 ha during the CMP to 4.81 ha during the SDM. There was no indication that any anthropogenic loss had occurred. 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

Walking, rock armour and erosion were recorded as neutral impacts. The presence of a pier that was extended after designation was recorded as a low-intensity negative impact affecting 1% of the habitat, but this was not considered to be a significant impact because of the small amount of change to the length of the pier and the lack of an obvious reduction in the rate of habitat development at the southern end of the spit. During the CMP, Future Prospects were assessed as Favourable, although land reclamation was recorded as a negative impact affecting all habitats. Future Prospects were assessed as Favourable (stable) during the SDM.

Conservation assessment

All of the parameters were assessed as Favourable during the SDM, as they were during the CMP. The conservation status of **2110 Embryonic shifting dunes** was assessed as Favourable (stable) during the SDM.

2.2.4 2120 Marram dunes (white dunes)

2120 Marram dunes (white dunes), like **2110 Embryonic shifting dunes,** are distributed widely around the coastline at Dooey. They are present as a linear habitat along the north-facing front and also along the edges of the islands of sand dunes to the south and east.

Area

2120 Marram dunes (white dunes) decreased in area from 10.55 ha during the CMP to 8.98 ha during the SDM. This is partly due to succession and recovery of damaged ***2130 Fixed dunes (grey dunes)** and partly due to erosion in the northern part of the site. There was no indication of loss due to human activities. Area was assessed as Favourable during the CMP. During the SDM, Area was assessed as Favourable (stable).

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

Walking, rock armour and erosion were recorded as neutral impacts. The presence of a pier that was extended after designation was recorded as a low-intensity negative impact affecting 1% of the habitat, but this was not considered to be a significant impact because it did not appear to have altered deposition rates in the west of the site. During the CMP, Future Prospects were assessed as Favourable. Future Prospects were assessed as Favourable (stable) during the SDM.

Conservation assessment

All parameters were assessed as Favourable both during the SDM and the CMP. The conservation assessment of **2120 Marram dunes (white dunes)** was assessed as Favourable (stable) during the SDM.

*2.2.5 *2130 Fixed dunes (grey dunes)*

***2130 Fixed dunes (grey dunes)** are the most extensive Annex I sand dune habitat at Dooey. They form the backbone of the spit and on the south-eastern sheltered bay-side of the spit several smaller islands of ***2130 Fixed dunes (grey dunes)** are present.

Area

The area of ***2130 Fixed dunes (grey dunes)** increased from 94.87 ha during the CMP to 97.04 ha during the SDM. This was the result of succession from **2120 Marram dunes (white dunes)**. No anthropogenic habitat loss was recorded. During the CMP, Area was assessed as Favourable. Area was assessed as Favourable (stable) during the SDM.

Structure and Functions

Only one criterion failed in the Structure and Functions assessment, and this assessed damage to the habitat due to disturbance. Trampling, campfires, quad-biking, off-road driving by cars and activities associated with agriculture have resulted in damage to the habitat, and damage was noted close to four stops. Structure and Functions were assessed as Favourable during the CMP, but damage due to disturbance was not considered as part of the Structure and Functions assessment at that time. Given the impacts recorded for the habitat, it would probably have been assessed as Unfavourable-Inadequate if the current methodology had been applied. Structure and Functions were assessed as Unfavourable-Inadequate (stable) during the SDM.

Future Prospects

Trampling, littering, campfires, off-road driving, a sports-pitch, tracks and animal enclosures were noted as negative impacts at Dooey. The most significant damage is associated with the unpaved track which runs through the centre of the site as this provides access to the habitat for cars and quad bikes. Trampling is most frequent in the southern part of the dunes, where visitors leave the track and take established routes to the shore. In the northern end of the spit, a sheep pen is associated

with disturbed substrate and nutrient enrichment, and agricultural weeds are frequent. Lack of grazing was recorded as a neutral impact as the structural diversity of the sward was indicative of a good balance of sheep grazing, rabbit grazing and relatively ungrazed swards. Secondary indications of undergrazing such as poor diversity and scrub were absent. Rabbit and sheep grazing were positive impacts. The sports pitch is not heavily used, but there are indications of some management to maintain it as a playable pitch. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate because of off-road driving and undergrazing. Other negative impacts listed included animal enclosures, tracks, a sports pitch, camping and caravans, pollution or other human impacts and land reclamation. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Conservation assessment

Area was assessed as Favourable while Future Prospects and Structure and Functions were assessed as Unfavourable-Inadequate. There has been no change in the assessment of any of the parameters since the baseline survey. The conservation status of ***2130 Fixed dunes (grey dunes)** was assessed as Unfavourable-Inadequate (stable) during the SDM.

3 Discussion

3.1 Pier

The OSI photographs indicate that a pier has been extended and upgraded to the west of the site, and this occurred between 1995 and 2005. Sediment accumulation is visible west of the pier, indicating that the currents and drift processes that brought sediment to the base of Dooey from the west have been interrupted. However, sufficient sediment is still reaching the proximal end of the peninsula to allow some dune building to take place.

3.2 Agriculture

Although there is some damage to the habitat associated with a sheep pen in the north of the site, the ***2130 Fixed dunes (grey dunes)** at Dooey are generally grazed at an appropriate level. Undergrazing was recorded from a limited part of the habitat, but the presence of some longer vegetation adds to the structural diversity of the habitat.

3.3 Amenity use

The main source of disturbance at Dooey is amenity use. Litter, trampling, campfires, unofficial paths and tracks and a sports pitch contribute to the disturbance of the ***2130 Fixed dunes (grey dunes).** However, most of the site is in good condition and only 10% of the ***2130 Fixed dunes (grey dunes)** would require management to reduce the effects of amenity use.

4 References

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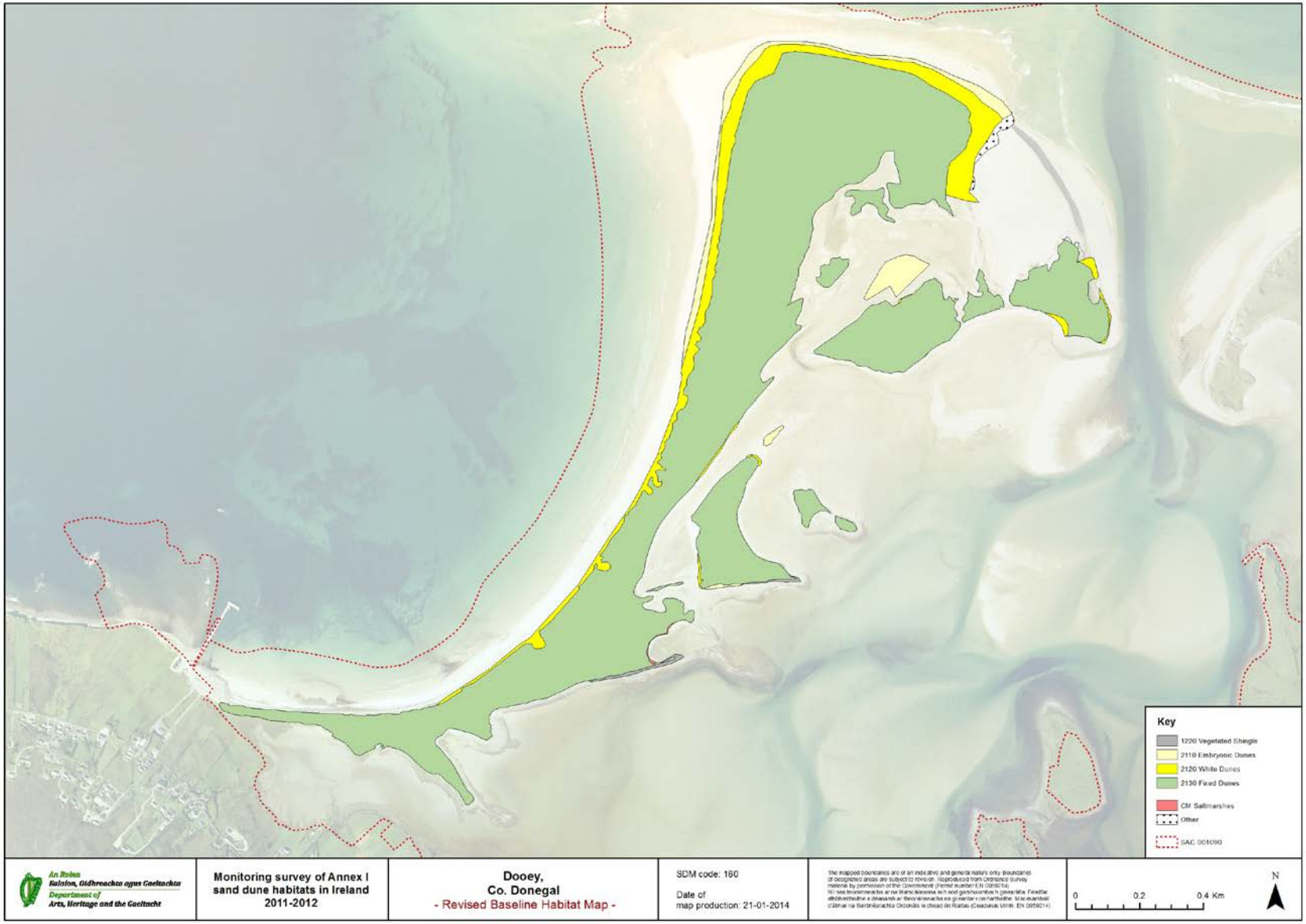
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2110 Embryonic Dunes
2120 White Dunes
2130 Fixed Dunes
CM Saltmarshes
Other
SAC 001090
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Monitoring survey of Annex I sand dune habitats in Ireland 2011-2012
Dooey, Co. Donegal
- Revised Baseline Habitat Map -
SDM code: 160
Date of map production: 21-01-2014
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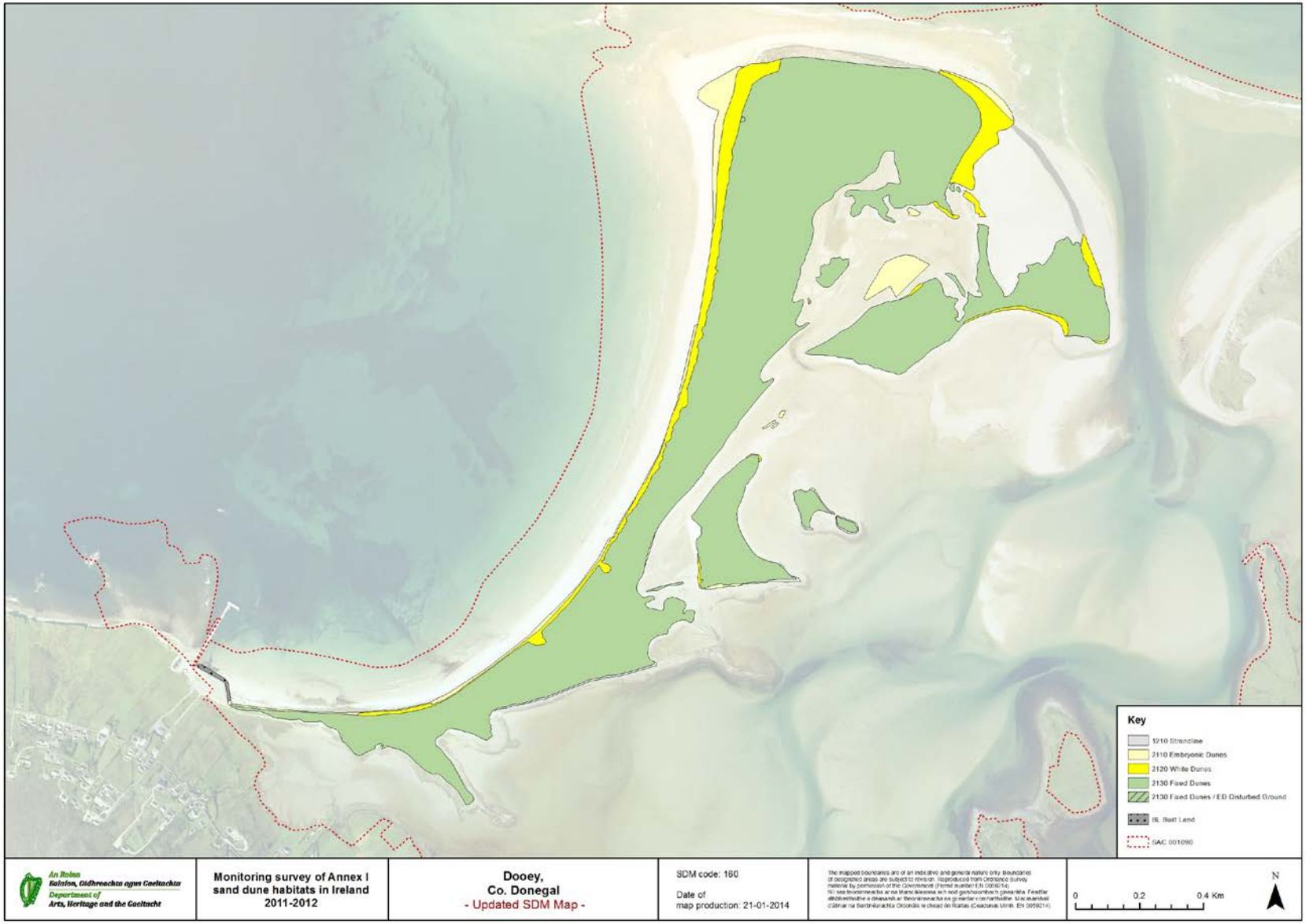
Key
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2110 Embryonic Dunes
2120 White Dunes
2130 Fixed Dunes
2130 Fixed Dunes / ED Disturbed Ground
BL Built Land
SAC 001090
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
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