Gweedore Bay and Islands SAC (site code 1141)
Conservation objectives supporting document -coastal habitats

NPWS

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Please note that the opinions expressed in the site reports from the Saltmarsh Monitoring Project (SMP), 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 (2015). Conservation Objectives: Gweedore Bay and Islands SAC 001141. 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.

Gweedore Bay and Islands is an extensive and ecologically diverse, coastal and marine site situated between Bloody Foreland in the north and Burtonport in the south, and near the towns of Derrybeg, Bunbeg and Annagary, on the north-west coast of Donegal. It includes a large stretch of coastline, many islands, including Inishsirrer, Inishmeane, Gola, Umfin, Inishfree Lower, Cruit and Owey and areas of marine water between the islands and the coast. The terrain is generally undulating with rocky knolls of exposed rock. The site is underlain with Granodiorite, a basic igneous rock. The coastline is very indented with several large intertidal inlets. Areas of machair grassland and sand dunes occur in several places along the coast and large areas of sandflats are exposed off the coast at low tide.

The site supports an excellent diversity of dunes with fixed dunes of particular note for their extent and area. Decalcified dunes are also well represented including a type with *Empetrum nigrum*. Embryonic shifting dunes are well developed, as are marram dunes and dune slacks. Machair occurs at several locations but the quality is often reduced by overgrazing and other activities. The Annex II liverwort species, petalwort (*Petalophyllum ralfsii*) occurs within the site.

The condition of the site at present is generally good, however, there are a number of on-going damaging operations that pose serious threats to the quality of the habitats, especially coastal heath and sand dunes. Principal threats are from overgrazing (mostly by sheep), agricultural reclamation of dune/machair areas, amenity activities, especially golf courses and caravan parks, building of holiday homes and drainage of wetland areas. The *Petalophyllum ralfsii* populations in particular are small and are vulnerable to changes in land use.

Gweedore Bay and Islands SAC (site code: 1141) is designated for a range of habitats including coastal lagoons, reefs, heaths, vegetated shingle, saltmarsh and sand dunes. The following ten coastal habitats are included in the list of qualifying interests for the site (*denotes a priority habitat):

- Perennial vegetation of stony banks (1220)
- Mediterranean salt meadows (*Juncetalia maritimi*) (1410) (MSM)
- Embryonic shifting dunes (1210)

- Shifting dunes along the shoreline with *Ammophila arenaria* (2120)
- Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)*
- Decalcified fixed dunes with Empetrum nigrum (2140)*
- Atlantic decalcified fixed dunes (Calluno-Ulicetea) (2150)*
- Dunes with *Salix repens ssp. argentea* (*Salix arenariae*) (2170)
- Humid dune slacks (2190)
- Machair (21A0)*

The first habitat represents vegetated shingle, the next is a saltmarsh habitat, the last eight are associated with sand dune systems. All ten of these habitats are usually found in close association with each other. The distribution of saltmarsh habitats is presented in Appendix I and sand dunes in Appendix II.

This backing document sets out the conservation objectives for the ten coastal habitats listed above in Gweedore Bay and Islands 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 **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). Some vegetated shingle was also recorded at the Gola Island sub-site by the Coastal Monitoring Project (Ryle *et al*., 2009). The distribution of known shingle sites in Gweedore Bay and Islands SAC is presented in Appendix I.

The NSBS visited the following two sub-sites within Gweedore Bay and Islands SAC:

1. Coastline from Port Uí Chuirean to Bunaninver
2. Port bun an Inbhir

During the NSBS, profiles and transects were recorded from each shingle beach and each site was assigned a crude High/Medium/Low interest ranking. A ‘high interest’ ranking denotes a site that is of high conservation value. The site may be of interest botanically or geomorphologically. A ‘medium interest’ ranking implies the site may be extensive but not of particular interest either botanically or geomorphologically. A ‘low interest’ ranking is reserved for small sites, highly damaged sites or sites that are of a very common classification. The vegetated shingle at both sub-sites are rated of high interest. The high rating at Coastline from Port Uí Chuirean to Bunaninver is owing to the long stretch of stabilised and unstable boulder beaches, while the high rating at Port bun an Inbhir is owing to the presence of an undisturbed shingle beach with a good variety of vegetation (Moore & Wilson, 1999).

The habitat was not mapped at any of the sub-sites, but the vegetation was recorded, as were the human impacts and alterations at the site, which are useful tools for assessing the Structure and Functions of the site.

The Coastline from Port ui Chuirean to Bunaninver sub-site is described as a long stretch of stabilised and unstable boulder beaches along the coastline east and south of Bloody Foreland. The exposure is high and the substrate is stony with rounded gravel. Several beach types are present including multi-ridged raised beach, unvegetated fringing beach and vegetated shingle ridge (Moore & Wilson, 1999).

The Port bun an Inbhir sub-site is described as a small undisturbed shingle beach backed by *Festuca rubra*-dominated grassland and rocky outcrops of granite. The beach is classified as a vegetated shingle ridge and exposure is high (Moore & Wilson, 1999).

A small area of Perennial vegetation of stony banks was also recorded at Gola Island by the CMP and consists of an unvegetated cobble storm beach as well as vegetated cobble (Ryle *et al.,* 2009).

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 one saltmarsh site within the Gweedore Bay and Islands SAC at Keadew (McCorry & Ryle, 2009).

Keadew strand occupies most of the southern shores of the intertidal bay. The saltmarsh is intimately associated with the extensive machair system at Keadew. Mediterranenan salt meadows (Juncetalia maritimi) (MSM) is the only Annex I saltmarsh habitat found at Keadew that is listed as a qualifying interest for the site, although Atlantic salt meadows (ASM) are also found here. A large proportion of the saltmarsh is in commonage, all of which is unfenced, or in state ownership and only a small number of fields in the south-eastern part of the site around Keadew Bridge is in private ownership.

Curtis and Sheehy Skeffington (1998) also recorded the presence of saltmarsh at the following sites:

1. Lunniagh
2. Annagary
3. Carnboy
4. Keadew

The distribution of mapped saltmarsh habitats within Gweedore Bay and Islands SAC is presented in Appendix II.

The conservation objectives for the saltmarsh habitats in this SAC are based on the findings from the Saltmarsh Monitoring Project (SMP) (McCorry & Ryle, 2009) as well as a combination of sources including NPWS internal files and the Coastal Monitoring Project (Ryle *et al*., 2009).

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 distribution of sand dune habitats within Gweedore Bay and Islands SAC is presented in Appendix II.

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 Gweedore Bay and Islands SAC (Ryle *et al*., 2009):

1. Keadew
2. Cruit Lower
3. Carnboy
4. Gola Island
5. Lunniagh
6. Kincaslough
7. Derrybeg

As part of the Coastal Monitoring Project (CMP) detailed individual reports and habitat maps were produced for all sub-sites and those compiled for sites 1 to 5 above are included in a set of Appendices to this document (Appendices IV to IX).

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 Kincaslough and Derrybeg) 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 Kincaslough and Derrybeg are included in Appendices X and XI.

The Keadew site (Appendix V) supports sand dunes and machair and stretches from the rocky headland of Keadew Point west to Mellamore. Keadew strand lies sheltered to the east of the headland and is fringed by saltmarsh and wet grassland (Ryle *et al*., 2009).

The Cruit Lower site (Appendix VI) is located on Cruit Sound which is southwest of Kincaslough and north of Keadew and is composed of a mosaic of extensive sandy substrates intermixed with heath and exposed rock habitats. A number of Annex I habitats occur on the island including machair, fixed dunes with herbaceous vegetation and decalcified fixed dunes with *Empetrum nigrum* (Ryle *et al*., 2009). The CMP noted however that a golf course has recently expanded in to fixed dunes by as much as 4ha (Ryle *et al.,* 2009).

The Carnboy site (Appendix VII) is a large site which is located north of Kincaslough and south of Derrybeg and stretches from Inishfree Bay to Gweedore Bay. It is a sandy spit or tombolo, which connects the island to the mainland. A large area of the sandy spit has been developed for Donegal Airport and is outside the boundary of the SAC (Ryle *et al*., 2009).

The Gola Island site (Appendix VIII) is one of the many islands that are included within Gweedore Bay and Islands SAC. The island is mostly uninhabited, except during the summer months (Ryle *et al*., 2009).

The Lunniagh site (Appendix IX) is the most northerly of the seven significant sand dune sites within Gweedore Bay and Islands SAC, and supports dune heath among its constituent habitats. The sand dune system at Lunniagh is large with extensive fixed dunes and a small machair in the southeastern corner of the site. The Annex II species, *Petallophyllum ralfsii*, a rare liverwort has previously been recorded in the most northerly of the dune slacks at this site. Unfortunately dumping of cars and machinery is a particularly serious problem at this site. In one location the CMP recorded 10 vehicles dumped in a stream channel at the southern end of the site (Ryle *et al.,* 2009).

The Kincaslough site (Appendix VII) is located south of Carnboy and just north of Cruit Island and supports a number of Annex I habitats in a relatively small area. This site has been under pressure from development (Ryle *et al*., 2009).

The Derrybeg site (Appendix IX) is located north of Carnboy and south of Lunniagh. A large golf course is located adjacent to the northern part of the site outside the SAC boundary. The site is composed of a large area of machair with some fixed dunes. The dunes to the south of the machair are noted to contain unusual *Chara*-dominated waterbodies (Crawford *et al*., 1996). To the east of the machair there is an estuary which is surrounded by saltmarsh and peatland. There is some good development of mobile dunes and embryo dunes on the

southern beach and there are small areas of strandline vegetation scattered in places (Ryle *et al*., 2009).

The conservation objectives for the sand dune habitats in Gweedore Bay and Islands SAC 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 seven sub-sites as surveyed by the CMP and SDM represent the total area of sand dunes within Gweedore Bay and Islands 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 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, supports 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

The overall objective for ‘perennial vegetation of stony banks’ in Gweedore Bay and Islands SAC is to ‘maintain the favourable conservation condition’. This objective is based on an assessment of the recorded 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 exact current extent of this habitat in Gweedore Bay and Islands SAC is unknown. The known distribution of shingle sites is presented in Appendix I. The National Shingle Beach Survey recorded but did not map the extent of vegetated shingle from the following two sub-sites (Moore & Wilson, 1999):

1. Coastline from Port uí Chuirean to Bunaninver
2. Port bun an Inbhir,

A total area of 0.02ha of vegetated shingle was also recorded and mapped at Gola Island by Ryle *et al.* (2009).

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

Donegal contains large areas of shingle beaches and is noted as a county for its raised beaches (Moore & Wilson, 1999). The distribution of known sites with vegetated shingle is presented in Appendix I. Vegetated shingle is known to occur at three sites but is likely to be more widespread.

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 extraction or coastal defence structures in particular, can interrupt the supply of sediment and lead to beach starvation.

Moore & Wilson (1999) recorded the presence of rock armour at the Coastline from Port Uí Chuirean to Bunaninver site. Extraction was also reported as an impact affecting this site. The level of impact that these structures are having on the site functionality and sediment supply is unclear.

The target is to maintain and restore where possible 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.

At the Coastline from Port uí Chuirean to Bunaninver sub-site, transitions to shingle based grassland, inter-tidal shingle, rocky shore and cliff occur.

At the Port bun an Inbhir sub-site, transitions to intertidal shingle and rocky shore occur.

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. The shingle habitat in Gweedore Bay and Islands SAC is known to support a typical flora for this habitat type.

Species recorded by the NSBS at the Port ui Chuirean to Bunaninver sub-site include long-leaved plantain (*Plantago lanceolata),* silverweed *(Potentilla anserina),* curled leaved dock *(Rumex crispus),* thrift *(Armeria maritima),* buck's-horn plantain *(Plantago coronopus),* long-leaved plantain *(Plantago lanceolata),* sea mayweed *(Tripleurospermum maritimum),* white clover *(Trifolium repens),* red fescue *(Festuca rubra),* sea campion *(Silene uniflora),* colt's-foot *(Tussilago farfara),* spear-leaved orache *(Atriplex prostrata) and* common scurvy grass *(Cochlearia officinalis)*. Lichens were also present (Moore & Wilson, 1999).

At Port bun an Inbhir sub-site, spear-leaved orache (*Atriplex prostrata),* wild carrot *(Daucus carota),* long-leaved plantain *(Plantatgo lanceolata),* silverweed *(Potentilla anserina),* bramble *(Rubus fruticosus)* and curled leaved dock (*Rumex crispus)* were recorded during the NSBS. Lichens were also recorded (Moore & Wilson, 1999).

In addition to the NSBS survey, Fay (1996) recorded sea pea (*Lathyrus japonicus*) on a shingle beach near Bunlack. This rare plant is one of the diagnostic species for the habitat.

The CMP recorded this habitat at Gola Island supporting typical species sea sandwort (*Honckenya peploides*) with small patches of marram (*Ammophila arenaria)* (Ryle *et al.,* 2009)

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 the 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*).

No negative species were recorded by the NSBS or the CMP at sub-sites within this SAC (Moore & Wilson, 1999; Ryle *et al.,* 2009).

The target for this attribute is that negative indicator species (including non-native species) should make up 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*) (1330) (ASM)
- **Mediterranean salt meadows (*Juncetalia maritimi*) (1410) (MSM)**
- Mediterranean and thermo-Atlantic Halophilous scrubs (Sarcocornetea fruticosi)

The third habitat (in bold) is listed as Qualifying Interests for Gweedore Bay and Islands SAC. The last habitat is restricted in its distribution to sites in the southeast of the country.

Curtis and Sheehy Skeffington (1998) recorded the presence of saltmarsh at the following sites:

1. Lunniagh
2. Annagary
3. Carnboy
4. Keadew

The sub-sites, Lunniagh, Carnboy and Keadew support sandflats-type saltmarsh that is mostly underlain by a sand substrate, while Annagary is a fringe type with a peat substrate (Curtis & Sheehy Skeffington, 1998).

Although this SAC is only listed for Mediterranean salt meadows as a qualifying interest, a large stretch of Atlantic salt meadow supporting thrift (*Armeria maritima)* and common saltmarsh grass (*Puccinellia maritima*) was recorded north of Derrybeg village (Crawford *et al.,* 1996).

The SMP surveyed one saltmarsh sub-site at Keadew, which is located in north-west Donegal within the region known as the Rosses. Keadew strand occupies most of the southern shores

of the intertidal bay. The saltmarsh community, for the most part is intimately associated with the extensive machair system at Keadew. Starting in the west of Keadew Strand inlet, there is a large intertidal saltmarsh plain. It extends patchily in an easterly direction around Keadew strand towards Keadew Bridge (McCorry & Ryle, 2009).

Mediterranean salt meadows (Juncetalia maritimi) MSM is the only Annex I saltmarsh habitat found at Keadew that is listed as a qualifying habitat for the site, although Atlantic salt meadows (ASM) are also found there and occupies 99% of the total saltmarsh vegetation of the Keadew sub-site (9.229ha) (McCorry & Ryle, 2009).

A large proportion of the saltmarsh is commonage, all of which is unfenced, or in state ownership and only a small number of fields in the south-eastern part of the site around Keadew Bridge are in private ownership (McCorry & Ryle, 2009).

The distribution of saltmarsh habitats within the SAC is presented in Appendix I.

4.1 Overall Objectives

The overall objective for 'Mediterranean salt meadows' in Gweedore Bay and Islands SAC is to '*maintain the favourable conservation condition*'.

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

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.

Baseline habitat maps were produced for the saltmarsh in Gweedore Bay and Islands SAC during the SMP. These maps are included with the individual site report in Appendix III at the end of this document. A total of 9.32ha of saltmarsh habitat was mapped by the SMP within the SAC at Keadew and an additional 59.61ha of potential saltmarsh habitat was identified

using aerial photographs, to give a total estimated area of 68.93ha for the SAC, of which 9.75ha is of qualifying interest.

The following rules were applied when calculating the areas for habitat mosaics 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.

The total area of MSM within the SAC and the total area within the site as mapped by the SMP are presented in the following table.

Sub-site	**Total area (ha) of MSM (excluding mosaics) from SMP**	**Total area (ha) of MSM within SAC boundary (including mosaics)**
Keadew	0.09	0.09
Potential MSM	9.66	9.66
Total	**9.75**	**9.75**

The target for Mediterranean salt meadows 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 the most important areas at Keadew as well as at Lunniagh, Annagary and Carnboy (McCorry & Ryle, 2009; Curtis & Sheehy Skeffington, 1998)

Possibly the largest area of saltmarsh within the site occurs in the shallow bay north of Derrybeg. A substantial area of Mediterranean salt meadow, dominated by *Juncus maritimus* occurs where the Cathleen river enters Derrybeg Bay.

At the Keadew sub-site, MSM occurs in three separate patches, and all of them confined to the northern perimeter of the site along the Keadew River, where it is typically located behind a narrow fringe of ASM vegetation over rock substrates.

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 habitat in Gweedore Bay and Islands SAC 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.

The target is to maintain and where possible restore 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.

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. As is the case on the majority of Irish saltmarshes, ASM is the dominant saltmarsh habitat in Gweedore Bay and Islands SAC, where it occurs in a mosaic with other saltmarsh habitats, including 'Mediterranean 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.

At the Keadew sub-site, non-saltmarsh habitats that were recorded on the boundary of the upper saltmarsh include embryonic and fixed coastal dunes and blanket bog. A small patch of brackish saltmarsh vegetation was also recorded by the SMP (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.

Rough grazing is the main agricultural activity in the Keadew sub-site area. Cattle, sheep and donkeys were observed by the SMP at time of survey. As the saltmarsh is not extensive, much of the grazing is confined to enclosed fields in the south-eastern corner of the site, however, there was evidence of livestock being trafficked across the intertidal zone between

fields or occasional grazing on the saltmarsh. Overall the grazing intensity on the saltmarsh habitats is low (McCorry & Ryle, 2009).

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.

There are a number of trails that criss-cross some of the saltmarsh habitats, particularly at the western end of the site. There are trails associated with pedestrian and vehicular traffic and can cause damage in the established salt-marsh communities (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 Gweedore Bay and Islands area.

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

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 not recorded in Gweedore Bay and Islands SAC by the SMP (McCorry & Ryle, 2009) or the Atlas Flora of Britain and Ireland (Preston *et al*., 2002).

The aim is that negative indicators such as *Spartina* should be absent or under control.
The current target for this particular site is prevent establishment of the species.

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. 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) ***

Nine dune habitats were recorded by Ryle *et al*. (2009) but only the eight habitats indicated in bold above are listed as Qualifying Interests for Gweedore Bay and Islands SAC. These habitats include mobile areas at the front as well as more stabilised parts of dune systems. Annual vegetation of driftlines was also recorded at the six sub-sites: Kincaslagh, Carnboy, Derrybeg, Keadew, Cruit Lower and Lunniagh.

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.

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).

At the older landward edge of the fixed dunes, leaching of basic minerals and nutrients can lower the pH over time and create conditions suitable for colonisation by heath species. As these decalcified or acidic conditions can only form on the older, landward extremes of dune systems, they are often vulnerable to housing or other developments. Well-developed dune heath communities containing the classic dwarf ericoid shrubs, such as *Calluna vulgaris* (Heather), and *Erica* spp., that are generally regarded as characterising the habit, are not well represented in Ireland.

Decalcified *Empetrum* dune habitat is also generally found on the landward edge of dune systems where the surface layers of sand have been leached of their calcium content, or where sand has blown up over rock that is siliceous (silica-rich) in nature. It is characterised by the presence of crowberry (*Empetrum nigrum*) which differentiates it from the other dune heath habitat. This heath-like habitat does not appear to be well developed in Ireland and is thought to be restricted to a small number of sites along the north-west coast.

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).

Dunes with creeping willow (*Salix repens*) occur where this shrub forms a dense ground cover and are found in close association with dune slacks. The distinguishing feature is the proximity of the water table to the surface, which in the case of dunes with *S. repens* is below a level where it exerts an influence on the vegetation. As a result, the moisture-loving plants generally associated with dune slacks are noticeably reduced or absent. Dunes with *S. repens* are often found on sandy hummocks within slacks, or on the sides of dune ridges adjacent to slacks.

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 seven sub-sites within Gweedore Bay and Islands SAC:

1. Keadew
2. Cruit Lower
3. Carnboy
4. Lunniagh
5. Gola Island
6. Kincaslough
7. Derrybeg

As part of the Coastal Monitoring Project (CMP) detailed individual reports and habitat maps were produced for all sub-sites and those compiled for sites 1 to 6 above are included in a set of Appendices to this document (Appendix IV to VIII). The updated site reports and habitat maps for Kincaslough and Derrybeg from the Sand Dunes Monitoring Project (SDM) are included in Appendix IX and X.

The combined data from the CMP for the sub-sites at Keadew, Cruit Lower, Carnboy, Lunniagh and Gola Island, along with the data from the SDM for the sub-sites at Kincaslough and Derrybeg is presented in Appendix II. A total of 604.40ha of sand dune habitat was mapped within the Gweedore Bay and Islands SAC, of which 0.69ha represents annual vegetation of driftlines, which is not listed as a qualifying interest for this particular site.

5.1 Overall objectives

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

The overall objective for 'Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)' in Gweedore Bay and Islands SAC is to 'maintain the favourable conservation condition'.

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

The overall objective for 'Decalcified fixed dunes with *Empetrum nigrum'* in Gweedore Bay and Islands SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Atlantic decalcified fixed dunes (Calluno-Ulicetea)' in Gweedore Bay and Islands SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Dunes with *Salix repens ssp argentea*' in Gweedore Bay and Islands SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Humid dune slacks' in Gweedore Bay and Islands SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Machair' in Gweedore Bay and Islands SAC is to 'restore the favourable conservation condition'.

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

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 Gweedore Bay and Islands SAC during the Coastal Monitoring Project (CMP) (Ryle *et al*., 2009). The maps are included with the individual site reports for Keadew, Cruit Lower, Carnboy, Gola Island and Lunniagh in the Appendices at the end of this document. The baseline habitat maps for Kincaslough and Derrybeg 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.

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

2110 Embryonic shifting dunes

Sub-site	Data source used	Total area within SAC boundary (ha)
Keadew	CMP	0.46
Cruit Lower	CMP	1.29
Carnboy	CMP	1.39
Gola Island	CMP	-
Lunniagh	CMP	-
Kincaslough	SDM	0.14
Derrybeg	SDM	0.69
Total		**3.97**

2120 Shifting dunes along the shoreline with *Ammophila arenaria*

Sub-site	Data source used	Total area within SAC boundary (ha)
Keadew	CMP	0.73
Cruit Lower	CMP	1.88
Carnboy	CMP	2.41

Gola Island	CMP	0.54
Lunniagh	CMP	3.68
Kincaslough	SDM	1.59
Derrybeg	SDM	3.96
Total		**14.79**

2130* Fixed coastal dunes with herbaceous vegetation

Sub-site	Data source used	Total area within SAC boundary (ha)
Keadew	CMP	14.74
Cruit Lower	CMP	30.55
Carnboy	CMP	56.83
Gola Island	CMP	3.38
Lunniagh	CMP	186.32
Kincaslough	SDM	79.90
Derrybeg	SDM	30.74
Total		**402.46**

2140* Decalcifed fixed dunes with *Empetrum nigrum*

Sub-site	Data source used	Total area within SAC boundary (ha)
Keadew	CMP	0.47
Cruit Lower	CMP	-
Carnboy	CMP	-
Gola Island	CMP	-
Lunniagh	CMP	-
Kincaslough	SDM	-
Derrybeg	SDM	-
Total		**0.47**

2150* Atlantic decalcified fixed dunes (Calluno-Uliccetea)

Sub-site	Data source used	Total area within SAC boundary (ha)
Keadew	CMP	-
Cruit Lower	CMP	3.57
Carnboy	CMP	-
Gola Island	CMP	-
Lunniagh	CMP	-
Kincaslough	SDM	-
Derrybeg	SDM	-
Total		**3.57**

2170 Dunes with *Salix repens* ssp *argentea*

Sub-site	Data source used	Total area within SAC boundary (ha)
Keadew	CMP	-
Cruit Lower	CMP	0.94
Carnboy	CMP	-
Gola Island	CMP	-
Lunniagh	CMP	-
Kincaslough	SDM	0.03
Derrybeg	SDM	-
Total		**0.97**

2190 Humid dune slacks

Sub-site	Data source used	Total area within SAC boundary (ha)
Keadew	CMP	0.01
Cruit Lower	CMP	0.34
Carnboy	CMP	0.38
Gola Island	CMP	-
Lunniagh	CMP	5.68
Kincaslough	SDM	1.09
Derrybeg	SDM	0.19
Total		**7.69**

21A0* Machair

Sub-site	Data source used	Total area within SAC boundary (ha)
Keadew	CMP	28.31
Cruit Lower	CMP	9.65
Carnboy	CMP	-
Gola Island	CMP	-
Lunniagh	CMP	39.69
Kincaslough	SDM	-
Derrybeg	SDM	92.13
Total		**169.78**

The general target for this attribute in the case of each habitat (with the exception of machair) is that the area should be stable, or increasing. In the case of machair is that the area should be increasing, in view of the recent recorded losses in the area of this habitat due to human impacts. 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.

Embryonic shifting dunes occur at all sub-sites except Gola Island and Lunniagh.

Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) and fixed dunes with herbaceous vegetation (grey dunes) occur at all seven sub-sites.

Decalcified dunes with *Empetrum nigrum* occurs atone sub-site: Keadew.

Atlantic decalcified fixed dunes occurs at one sub-site- Cruit Lower.

Dunes with *Salix repens ssp. argentea* (Salix arenariae) occurs at two sub-sites: Cruit lower and Kincaslough.

Humid dune slacks occur at all sub-sites except Gola Island.

Machair was recorded at three sub-sites, the exceptions being Carnboy,Gola Islandand Kincaslough.

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.

5.4 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 Gweedore Bay and the Islands 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 are naturally dynamic systems that require continuous supply and circulation of sand. Sediment supply is especially important in the embryonic dunes and mobile dunes, as well as the strandline communities where accumulation of organic matter in tidal litter is essential for trapping sand and initiating dune formation. The construction of physical barriers such as sea defences can interrupt longshore drift, leading to beach starvation and increased rates of erosion. Sediment circulation and erosion also has a role to play in the more stabilised dune habitats. Cycles of erosion and stabilisation are part of a naturally functioning dune system, where the creation of new bare areas allows pioneer species and vegetation communities to

develop, increasing biodiversity. The construction of physical barriers can interfere with the sediment circulation by cutting the dunes off from the beach resulting in fossilisation or over-stabilisation of dunes.

The CMP noted that the mobile dunes at Keadew were undergoing natural erosion, a process that is not considered as unfavourable in relation to extent of habitat. The dunes are undergoing coastal retreat as evidenced by the eroded face of fixed dunes and the steep front of the mobile dunes. The natural erosion at this site, however, is exacerbated by trampling by pedestrians. Sand extraction in the fixed dunes at this site was reported by the Biomar survey (Crawford *et al*. 1996).

At Cruit Island the CMP noted that the mobile dunes which are located on the western side of the Island are functioning well with a high degree of sand accretion. Severe erosion has occurred at the south western beach (Cruit strand) to the front of the machair as a result of cars being parked in order to access the beach. There is also some loss in extent of the machair habitat at Cruit Island due to anthropogenic activities.

At Kincaslough, the mobile dunes are eroding at the western end of the sub-site. The natural erosion is compounded by possible sand extraction as well as trampling and over use by visitors to the beach. The mobile dunes at the eastern end of the beach are functioning well with a high degree of sand accretion (Ryle *et al*., 2009).

The machair at Kincaslough has a road running through it leading to a tarmacadam car park in the north of the habitat, which has decreased the extent of the habitat and is likely to affect the natural functioning of the habitat (Ryle *et al,.* 2009).

At Carnboy sub-site, the mobile dunes have been eroded in the past but were rebuilding at the time of the CMP survey, in particular at the beach at Inishfree Bay where they are fronted by embryonic habitat. There are some areas, however, that are lacking mobile dune habitat with an exposed fixed dune face present. At Illannamarve Strand at Carnboy, the mobile dune habitat is also patchy and it has eroded back to the fixed dune in places. The habitat is also discontinuous at the beach at Dunmore Strand (Ryle *et al*., 2009).

At Derrybeg, rock armour has been placed on the edge of a walkway and pier in the north-west of the sub-site. The mobile dunes are eroded behind the rock armour (Ryle *et al*., 2009).

At Lunniagh, mobile dune area is restricted to the southern extreme of the site, on the north shore of the Catheen River Estuary, where sand dune deposition on the north side of the river is leading to some substantial fore dune accretion and mobile dunes measure up to 50m wide

in places. The CMP also noted that sand extraction was occurring in both the fixed dunes and dune slacks at Lunniagh and a sand quarry is present in the fixed dunes (Ryle *et al.,* 2009).

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.

5.4.2 Physical structure: hydrological and flooding regime

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

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

Dune slack habitats should never be considered in isolation, but as part of the larger dune system that functions as an eco-hydrological unit. Dune slacks are highly sensitive to human influences on their hydrology, either through water abstraction or drainage works. Most dune slacks are fed by a range of water sources, including precipitation, 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).

Dune slack and dunes with *Salix repens* were recorded at Cruit Lower sub-site by the CMP. At this site, two slacks were recorded one within the SAC and one outside the SAC and within

the adjacent golf course. The CMP suggest that the slack within the SAC may be subject to drying out as a result of the presence of the golf course causing an overall change in water table levels in the fixed dunes (Ryle *et al*., 2009).

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 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.

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.

At Keadew, the main area of fixed dune occurs directly west of Portacurry where it occurs over rocky outcrops in close association with coastal heath. At Keadew Point the fixed dune edges the seaward side of the machair. On the landward side, the fixed dune grades into wet

grassland and rocky outcrops. Saltmarsh also fringes the eastern edge of the fixed dunes at Keadew strand (Ryle *et al*., 2009).

At Cruit Lower sub-site the machair is located in the south eastern part of the island and is surrounded by a mosaic of outcropping rock and coastal grassland to the south and west and by fixed dune to the north. Cruit Strand has a rocky headland to the north and an accreting spit to the south end. The spit is composed of a band of fixed dune, mobile dune and embryonic dune. There is also a patch of dune heath (decalcified dunes with *Empetrum nigrum*) and rocky outcrop mosaic to the south of the accreting spit which is bounded by the machair (Ryle *et al.,* 2009).

At Kincaslough, the machair grades in to wet fen-type vegetation that surrounds a small lake in the south of the site.

At Derrybeg, there are zonations between machair, dunes with *Salix repens* and dune slack habitats as well as fixed dunes and albeit eroded mobile dunes (Ryle *et al*., 2009).
Within the Derrybeg sub-site, to the south of the estuary at Inishcoole, there is an extensive area of saltmarsh (Ryle *et al.,* 2009).

At Gola Island the fixed dune habitat grades into mesotrophic grassland on the main island (Ryle *et al*., 2009).

At Lunniagh the machair habitat is bordered to the south by saltmarsh vegetation that has formed in the short estuary at the southern boundary of the site and by fixed dunes to the north and west (Ryle *et al.,* 2009).

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 applies to fixed dunes, dunes with *S. repens* and dune slacks. It does not apply to the other habitats present where high levels of bare sand are a natural component of the habitat. In the fixed and slack areas, some degree of instability is vital. Constant cycles of erosion and stabilisation provide the necessary conditions for the establishment of pioneer species and species that favour open conditions such as petalwort (*Petalophyllum ralfsii*) and a range of invertebrates, helping to increase biodiversity.

Petalwort was recorded at Keadew, Derrybeg and Lunniagh sub-sites by D.T. Holyoak (2002).

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.

5.4.5 Vegetation composition: plant health of dune grasses

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

The CMP noted patches of dying *Ammophila arenaria* in the mobile dunes in the north west of the sub-site at Cruit lower (Ryle *et al*., 2009).

At Kincaslough sub-site, the CMP noted healthy, green marram (*Ammophila arenaria*) at the eastern end of the beach, however, the mobile dune habitat declines in condition along the beach and is composed of dead or dying marram on a narrow steep ridge for the most part and disappears altogether at the western end. In the small areas of embryo dunes at this site, healthy sand couch (*Elytrigia juncea*) was recorded by the CMP with plenty of flowering heads present (Ryle *et al*., 2009).

At Carnboy, in the areas of intact mobile dune habitat, the CMP noted frequent healthy growth of marram (*Ammophila arenaria*) (Ryle *et al.,* 2009).

At Derrybeg, the CMP estimated that unhealthy cover of grasses accounted for greater than 20% of each monitoring stop (Ryle, *et al*. 2009).

The mobile dunes at Gola Island were recorded by the CMP as supporting healthy *Ammophila arenaria* with plenty of new green shoots at the seaward edge of the habitat (Ryle *et al,* 2009).

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

5.4.6 Vegetation structure: vegetation height

This attribute applies to the more fixed habitats (fixed dunes, dunes with *S. repens* and dune slacks). A varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds. The ecological benefits of moderate levels of grazing on dunes have been well documented (Gaynor, 2008). Moderate grazing regimes lead to the development of a species-rich vegetation cover. The animals increase biodiversity

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

At Keadew, the fixed dune is generally undergrazed and the machair at the eastern part of the site at Keadew is grazed lightly by cattle and donkeys as a result it is undergrazed and declining in condition (Ryle *et al.,* 2009)

At Cruit lower, both the fixed dunes and the machair are ungrazed resulting in a tall sward with low species diversity (Ryle *et al.,* 2009).

The machair at Kincaslough is lightly grazed by cattle.

Cattle graze part of the fixed dunes at Carnboy producing a more open, species rich sward with less marram (*Ammophila arenaria*), however, where cattle are absent the sward is rank (Ryle *et al*., 2009).

High numbers of sheep graze the machair at Derrybeg and in places the habitat is overgrazed. Rabbits also graze this habitat. In the southern part of the site (Magheraclogher), there are few cattle grazing the machair and the habitat is mostly undergrazed. Fixed dunes, dune slacks, dunes with *Salix repens* are also lightly grazed (Ryle *et al.,* 2009).

The fixed dune grassland at Gola Island is grazed by sheep but is currently undergrazed as the sward height is greater than the target height of 20cm (Ryle *et al*., 2009).

At Lunniagh substantial areas of the fixed dunes and machair, mostly in the southern half of the site are adversely affected by overgrazing by livestock. Sheep are the main grazers but cattle were also present at time of survey. At this sub-site, dune slacks are also affected by overgrazing and soil poaching was noted by the CMP in slacks in the more intensively grazed parts of the site. Grazing by rabbits is also at a high level at this site (Ryle *et al.,* 2009).

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

5.4.7 Vegetation structure: vegetation cover

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

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

5.4.8 Vegetation composition: typical species & sub-communities

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

The Annex II plant species *Petalophylium ralfsii* was recorded on the headland at Keadew machair as well as in wet machair south of the golf course at Derrybeg by D.T. Holyoak (2002). This rare liverwort had also been previously recorded from machair at Lunniagh.

The moss and lichen species, *Homalothecium lutescens, Hylocomium splendens, Rhytidiadelphus squarrosus, Rhytidiadelphus triquetrus, Scleropodium purum, Tortula ruraliformis, Peltigera spp.* and *Cladonia spp.* are abundant throughout the machair at Keadew.

At the Kincaslough sub-site there is an abundance of orchid species including frog orchid (*Coeloglossum viride*), common twayblade (*Listera ovata*), pyramidal orchid (*Anacamptis pyramidalis*) and fragrant orchid (*Gymnodenia conopsea*) in the fixed dune habitat. The presence of this number of orchids species is a feature of local distinctiveness of the site A high abundance of mosses were recorded throughout the fixed dunes at this site and *Peltigera* lichens are also widespread in places. (Ryle *et al.,* 2009).

At the dune slack at the eastern part of the Kincaslough sub-site, butterfly orchid (*Platanthera* species) was noted by the CMP.

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

5.4.9 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 negative indicator, ragwort (*Senecio jacobaea)* occurs occasionally throughout the fixed dunes at Keadew (Ryle *et al.,* 2009).

At Keadew, negative indicator species such as agricultural grasses and weeds were a minor component of the machair grassland.

At Cruit Lower a small patch of sea buckthorn (*H. rhamnoides*) was recorded by the CMP. Also within this sub-site the CMP recorded bracken (*Pteridium aquilinum*) in the dune slack (Ryle *et al*., 2009).

At Kincaslough, there is some encroachment by sea buckthorn (*Hippophae rhamnoides)* in the fixed dune habitat. Also at this site there is an abundance of ragwort (*Senecio jacobaea*) in places and bracken (*Pteridium aquilinum*) was recorded in fixed dune in the far east of the sub-site (Ryle *et al.,* 2009; Delaney *et al*., 2013).

Bracken (*Pteridium aquilinum*) was recorded in the fixed dunes at Carnboy. Other negative indicator species recorded at this site include bramble (*Rubus fruticosus*), common ragwort (*Senecio jacobaea*) and creeping thistle (*Cirsium arvense*) (Ryle *et al.,* 2009).

At Derrybeg sub-site, negative indicators ragwort (*Senecio jacobaea*) and bracken (*Pteridium aquilinum*) were recorded (Ryle *et al.,* 2009; Delaney *et al*., 2013).

At Gola Island negative indicators, common ragwort (*Senecio jacobaea*), creeping thistle (*Cirsium arvense*) and common nettle (*Urtica dioica*) occur throughout the fixed dune habitat (Ryle *et al.,* 2009)

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

5.4.10 Vegetation composition: scrub/trees

This attribute only applies to the fixed dunes. 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.

Burnet rose (*Rosa pimpinellifolia*) was recorded in the fixed dune at Kincaslough and Derrybeg by the CMP (Ryle *et al*., 2009).

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.

5.4.11 Vegetation composition: bryophytes

This attribute applies to Machair. Bryophytes are an important element of the machair flora.

The target for this attribute therefore is that the cover of bryophytes should and should always be at least an occasional component of the vegetation **(**Ryle *et al*., 2009).

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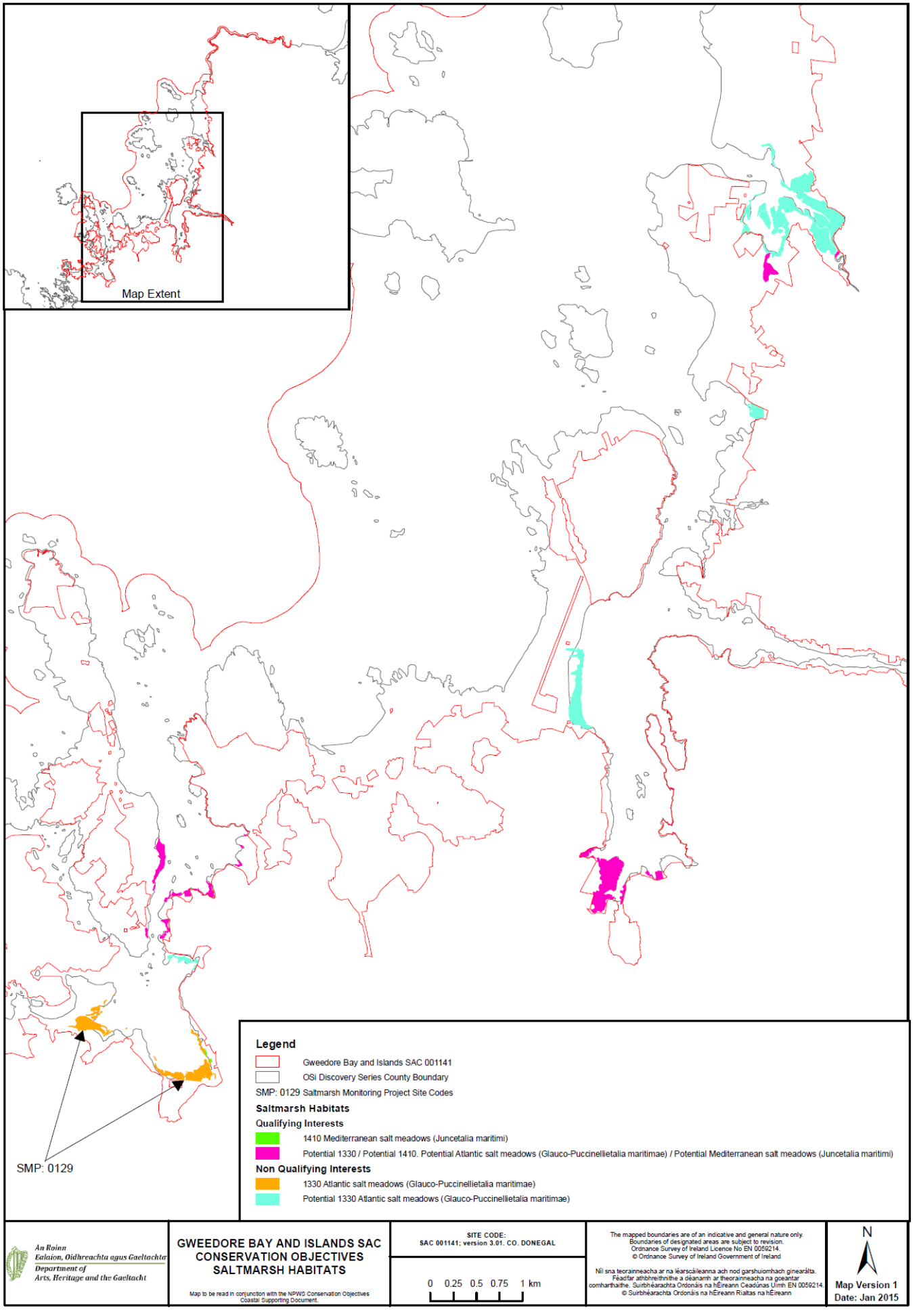
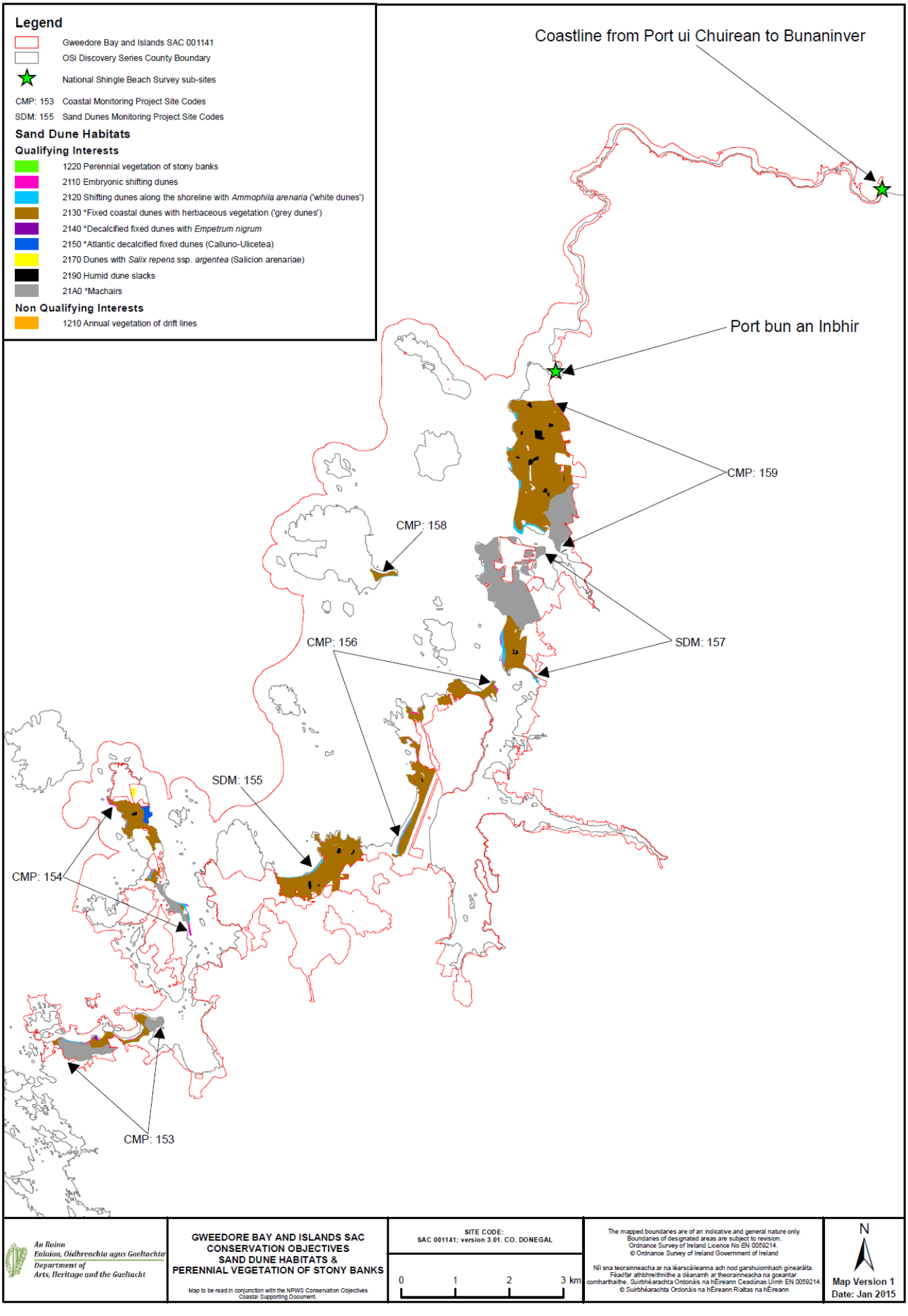
Appendix I: Distribution map of saltmarsh habitats within Gweedore Bay and Islands SAC**.**



Appendix II – Distribution map of sand dune habitats within Gweedore Bay and Islands SAC



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

SITE DETAILS

SMP site name: **Keadew**	SMP site code: **0129**
Dates of site visit: **9 September 2008**	CMP site code: **153**
SM inventory site name: **Keadew**	SM inventory site code: **19**
NPWS Site Name: **Gweedore Bay and Islands**	
NPWS designation cSAC: **1141**	MPSU Plan: **Old Format – Draft 2: Consultation**
pNHA: **1141**	SPA: **N/A**
County: **Donegal**	Discovery Map: **1** Grid Ref: **174220, 417030**
Aerial photos (2000 series): **O 0198-D; O 0199-C,D; O 0223-B; O 0224-A,B**	6 inch Map No: **Dg 040, 041**
Annex I habitats currently listed as qualifying interests for Gweedore Bay and Islands cSAC: **H1410 Mediterranean salt meadows (Juncetalia maritimi)**	
Other SMP sites within this SAC/NHA: **N/A**	
Saltmarsh type: **Sand flats**	Substrate type: **Sand**

SITE DESCRIPTION

Keadew is located in north-west Donegal within the region known as the Rosses. The area is largely rural with some dispersed habitation, mostly along the small road network although the number of dwellings increases considerably in the higher ground overlooking Keadew Strand. Most of these houses are holiday homes. The nearest centres of population include Kincaslough to the North and Burtonport to the south-west.

Keadew Strand occupies most of the southern shores of the intertidal bay. The saltmarsh community, for the most part is intimately associated with the extensive machair system at Keadew. Starting in the west of Keadew Strand inlet, there is a large intertidal saltmarsh plain. It extends patchily in an easterly direction around Keadew Strand towards Keadew Bridge. It does not extend much further along the northern shore of the inlet and is largely replaced by outcropping granitic rock and blanket bog. A regional road between Burtonport and Kincaslough marks the upper boundary of the coastal area along the southern side of Keadew Strand. This road has cut off former coastal habitats behind the road. Two small streams flow into Keadew Strand from the southern side.

Keadew saltmarsh lies within Gweedore Bay and Islands candidate Special Area of Conservation (cSAC), a large composite site covering a wide area. A number of other saltmarsh systems that are listed in the National Inventory (Curtis and Sheehy-Skeffington

1998) occur within the cSAC, but none were included in the list of sites to be surveyed. Mediterranean salt meadows (Juncetalia maritimi) (MSM) is the only Annex I saltmarsh habitat found at Keadew that is listed as a qualifying habitat for the site, although Atlantic salt meadows (ASM) are also found there. A further twelve habitats are listed for this cSAC, four of those with priority status. The cSAC is also known for the presence of a number of rare plants and bryophytes including the Annex II species Petalwort (*Petalophyllum ralfsii)* and Slender Najas (*Najas flexilis*).

A large proportion of the saltmarsh is in commonage, all of which is unfenced, or in state ownership and only a small number of fields in the south-eastern part of the site around Keadew Bridge were in private ownership. The site is readily accessible at a number of locations. There are a number of lay-bys leading onto the strand on the coastal road leading to Keadew Bridge. Alternatively, it is possible to cross the machair grassland in the western end of the site.

SALTMARSH HABITATS

General description

The saltmarsh is primarily associated with Keadew Strand. The coastal vegetation including machair and dune habitats were recently surveyed as part of the Coastal Monitoring Project in 2006 (Ryle *et al*. 2009). That survey made little reference to the occurrence of the saltmarsh habitats other than to map a boundary between sand dune and saltmarsh vegetation. During the current survey, two Annex I saltmarsh habitats were recorded at the site, namely Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). The total area of saltmarsh that is mapped at Keadew is 9.32 ha, of which the major portion (99%) is ASM with some very minor patches of MSM.

All of the saltmarsh vegetation occurs within the confines of the cSAC boundary. It extends discontinuously around Keadew Strand. There are two main areas of saltmarsh vegetation at this site with some fringing vegetation at either end. The smaller area is found at the western end of the site and has developed in a sheltered area behind a sand spit extending to Keadew Point. The saltmarsh transitions to fixed dune and machair grassland along the upper boundary. There are intertidal sandflats exposed at low tide adjacent to the saltmarsh. There is some dynamic development of embryonic dunes on higher mounds near the seaward edge on this saltmarsh, as well as pioneer vegetation where the saltmarsh is accreting.

The largest section is found along the southern side of Keadew Strand, which also drains at low tide to expose intertidal sandflats. These two large areas of saltmarsh are separated by exposed rocky shores e.g. the south-western quadrant of the site and consist of areas of dry heath and blanket bog over a massive granitic intrusion. The road embankment across the

southern side of Keadew Strand generally marks the upper boundary of the saltmarsh with some development of disturbed coastal grassland between the road and the saltmarsh. There is also some transition from saltmarsh to modified blanket bog along a landward boundary at the south-east corner of Keadew Strand. Some brackish habitat extends along a river channel south of the road and embankment at Keadew Bridge.

Other non saltmarsh habitats that were recorded along the upper boundary of the saltmarsh included embryonic and fixed coastal dunes, and blanket bog. These habitats are under-recorded as they extend some distance away from the saltmarsh. A small patch of other brackish saltmarsh vegetation, dominated by Common Reeds (*Phragmites australis*), was noted at one location. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. Its extent is probably underestimated as the land was privately owned and had a number of horses and ponies at the time of the survey.

Table 3.1. Area of saltmarsh habitats mapped at Keadew.

EU Code	Habitat	Area (ha)
H1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	9.229
H1410	Mediterranean salt meadows (Juncetalia maritimi)	0.089
	Total	**9.318**

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

Atlantic salt meadows (H1330)

The saltmarsh at Keadew is dominated by ASM vegetation and it accounts for 99% of the total saltmarsh vegetation that was recorded from this site. The ASM occurs as two separate areas, one located behind the relatively sheltered headland of Keadew Point, whilst the second stretch of ASM is located in the south-eastern or uppermost part of Keadew Strand inlet. Both sections of saltmarsh are characterised by the presence of the large intertidal sand flats that occupy much of the inlet.

Throughout the ASM communities, the most frequently recorded species was Sea Milkwort (*Glaux maritima*), although its abundance changed in various zones. The pioneer vegetation is dominated by Common Saltmarsh Grass (*Puccinellia maritima*), although smaller abundances of Thrift (*Armeria maritima*), Sea Plantain (*Plantago maritima*) and Glasswort (*Salicornia* spp.) were also recorded. This pioneer vegetation is found in the north-west section. The pioneer vegetation is highly dynamic as blowing sand was a feature of the site, and it is likely that the vegetation is regularly reshaped with changes in extent of the saltmarsh and embryonic dunes.

The development of low marsh vegetation was less significant at Keadew and often the pioneer vegetation often graded into mid marsh vegetation. The vegetation, where recorded, was typically characterised by species such as Sea Aster (*Aster tripolium*), Thrift, Common Scurvy-Grass (*Cochlearia officinalis*), Sea Plantain and Sea Arrow-Grass (*Triglochin maritimum*).

Not surprisingly, the upper marsh vegetation generally supported the greater diversity of species, although many of those recorded in lower zones were no less common. The most commonly recorded species included Red Fescue (*Festuca rubra*), Common Scurvy-Grass and Sea Plantain. Other species not previously recorded included Distant Sedge (*Carex distans*), Extended Sedge (*Carex extensa*) and Saltmarsh Rush (*Juncus gerardii*). In wetter situations, Creeping Bent Grass (*Agrostis stolonifera*) was noted whilst at one stop - Buck's Horn Plantain (*Plantago coronopus*) was recorded as having 30-40% ground cover.

One notable species was Flat Saltmarsh sedge (*Blysmus rufus*) and this species was an occasional component of the upper marsh, in vegetation transitional to the sand dune habitats.

Mediterranean salt meadows (H1410)

There is very little development of MSM vegetation at Keadew and a little under 0.1ha was recorded (Table 3.1). It occurs in three separate patches, all of them confined to the northern perimeter of the site along the Keadew River, where it is typically located behind a narrow fringe of ASM vegetation over rocky substrates. Characterised by the presence of the distinctive Sea Rush (*Juncus maritimus*), this habitat is not floristically diverse or extensive. Other species included Saltmarsh Rush, Creeping Bent and patchy Red Fescue.

IMPACTS AND ACTIVITIES

Table 4.1 lists all the activities and their impacts on both of the saltmarsh habitats at Keadew. Few were causing any lasting damage to the vegetation, and all are localised. The land use in and around the locality comprises mostly small or subsistence farm holdings on rocky land which is largely dominated by blanket bog. Unlike most saltmarsh systems in Donegal, the most noticeable activities are associated with tourists, holiday makers and recreational activities rather than agricultural management.

Rough grazing (140) is the main agricultural activity in the area. Much of the land is composed of extensive rocky outcrops with blanket bog and scrub. A number of small fields

are dotted around the area, but the land is best described as marginal. Cattle, sheep and donkeys were observed at the time of the survey. As the saltmarsh is not extensive, much of the grazing was confined to enclosed fields in the south-eastern corner of the site. However, there was evidence of livestock being trafficked across the intertidal zone between fields or occasionally grazing on the saltmarsh. These activities were rarely prolonged and the impacts rarely damaging. The overall grazing intensity on the saltmarsh habitats is low.

There are a number of trails (501) that criss-cross some of the saltmarsh habitats, particularly at the western end of the site. They are more prominent in the machair vegetation. The trails are associated with foot traffic (622), mostly recreational users accessing the sand flats by foot. However, there are a number of well defined trails that vehicles use, which lead onto the intertidal zone (623). Some of the vehicular use was associated with tractors accessing small fields. However, there was some evidence of cars being brought onto the beach, and there were clear signs of quad bikes being driven over the saltmarsh at the western end of the site. Although the pioneer vegetation is dynamic in nature, the established saltmarsh communities are prone to damage, as seen on some unvegetated trails.

Although much of the housing is dispersed (403) around Keadew Bridge, a large number of residential and holiday homes were noted around the site, particularly on elevated ground above Keadew Strand (402). The area is popular, particularly in the summer months, and a lot of the domestic dwellings are rented out to tourists. It is likely that the pressure of pedestrian traffic is far greater on parts of the saltmarsh, towards the western end of the site where there are extensive sand flats. Approximately six caravans (608) are located on the dune grassland, adjacent to the upper saltmarsh transition. There is a possibility that waste water from these caravans drains directly down into the sands. Depending on what is released, this could have some impact on the saltmarsh through pollution (421).

The historical OSI 2nd edition 6 inch map indicates the presence of a significant area of saltmarsh around Keadew Strand. The map indicated the highest point to which ordinary tides flowed, but much of this former saltmarsh was trapped behind the road. This ground (around Parkkeadew) is now some distance removed from the influence of saline waters and has been redeveloped as a GAA football ground. Another factor which is not assessed as it occurred outside of the monitoring period is the development of the road fronting Parkkeadew. It has been modified, strengthened and culverted in places, which has probably facilitated the drainage of the land to the south of the road for development as a football pitch.

A comparison of the 2nd edition 6 inch map to the OSI 2005 series aerial photographs shows that there has been significant growth of saltmarsh into Keadew Strand north of the road. Much of this growth is likely to have been a response to the development of the new road and embankment. However, there has been no significant measurable growth of saltmarsh at this location during the current monitoring period and a low saltmarsh cliff marks most of the lower

saltmarsh boundary. There are some active signs of accretion at the mouth of the river flowing into the central part of the saltmarsh (910).

At the western end of the site, it is likely that sand has built up over the past century and the saltmarsh vegetation has subsequently developed. With natural accretion (910) the saltmarsh is likely to have developed and extended over time. The profile of this shoreline has also changed significantly since the 6 inch map was drawn and most of this saltmarsh habitat has developed in the past 100 years (910). This area is quite dynamic. However, as part of this natural dynamism, there was also some evidence of erosion (900), particularly a low erosion ridge along with remnant tufts of ASM vegetation along the saltmarsh frontline to the east of the site. There is some minor increase in extent noted when comparing the 2000 and 2005 series OSI aerial photos (probably of the order of < 0.005 ha). An assessment of the current trends indicates that there is an overall accretional trend at this site. Erosion is assessed as having a neutral impact on a small portion of the saltmarsh and is more than compensated by the accretion at the site.

Table 4.1. Intensity of various activities on saltmarsh habitats at Keadew.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
H1330	140	C	0	2.0	Inside
H1330	501	B	-1	0.01	Inside
H1330	622	C	0	0.01	Inside
H1330	623	B	-1	0.02	Inside
H1330	900	C	0	0.5	Inside
H1330	910	C	+1	0.05	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.
1 [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.

CONSERVATION STATUS

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. There is little other detailed information for this site.

The conservation assessment of both of the saltmarsh habitats that were recorded at Keadew is shown in Table 5.1. As both the ASM and MSM were favourably assessed, the overall conservation assessment of the saltmarsh habitats at Keadew is *favourable*.

As previously stated, the earliest OSI data does not show the presence of saltmarsh habitat as occurring at Keadew, which suggest that the saltmarsh has only developed over the past 100 years or so. Indeed it may still be developing. Analysis of the aerial photographs, however, does not indicate any measurable change in saltmarsh extent. More recently the sand dune habitats at Keadew were mapped (Ryle *et al*. 2009). There is some discrepancy between the upper limit of the ASM boundary of the saltmarsh mapped at the western end of the site during this survey with that mapped as part of the Coastal Monitoring Project in 2006. Although that survey was concerned with sand dune habitats, it often indicated saltmarsh habitats that occurred alongside the sand dunes. This does not imply that there has been a substantial loss of habitat in two years, but that the classification criteria used in delineating the upper boundary of pure ASM was different. Indeed, much of the large area of ASM mapped during the coastal monitoring project has been reclassified as transitional coastal grassland which although containing some saltmarsh elements, does not warrant its classification as Annex I habitat.

This site is located within the Gweedore Bay and Islands cSAC. An old format management plan is available for this cSAC but is now out of date.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Keadew.

Habitat	**EU Conservation Status Assessment**			
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**	**Overall EU conservation status assessment**
Atlantic salt meadows (H1330)	Extent Structure and functions Future prospects			Favourable
Mediterranean salt meadows (H1410)	Extent Structure and functions Future prospects			Favourable

Atlantic salt meadows (H1330)

Extent

The extent of the ASM is rated as *favourable* (Table 5.1). There is no quantitative data as to the former magnitude of this habitat at Keadew. The saltmarsh has been modified in the past by the construction of a road along the southern side of Keadew Strand that cut off a significant area of former saltmarsh habitat. Some of this area may have been infilled to create the football pitch. However, these impacts are not assessed as they occurred outside the current monitoring period.

There are no indications of any loss of habitat due to land use changes, development or erosion within the current monitoring period, although there was a low erosion ridge, a short distance in front of the frontline, toward the south-eastern part of the site. However, the overall assessment is that the ASM is still expanding. There were signs of accretion and a low accretion ramp was found in places along the front of the saltmarsh, particularly at its western end.

Habitat structure and functions

Ten monitoring stops were carried out. All of them satisfied the target criteria resulting in a *favourable* assessment of the structure and functions (Table 5.1). The saltmarsh is in good condition and a range of vegetation zones are present, ranging from pioneer through to upper ASM communities. The saltmarsh topography is moderately well-developed although there are few salt pans in some of the saltmarsh. The ASM is part of a larger coastal ecosystem and there are natural transitions to fixed dune, machair grassland and modified blanket bog vegetation. The pioneer ASM forms a dynamic mosaic with embryonic dunes where there is built up of sand in the north-west corner of the site. There were few impacts of note affecting the quality and condition of the vegetation.

Future prospects

The future prospects of this habitat are assessed as *favourable*. The majority of the saltmarsh at Keadew is comprised of ASM vegetation and the assessment assumes that there will be no change in the management regime.

Mediterranean salt meadows (H1410)

Extent

In terms of area, the MSM vegetation is relatively small compared to the amount of ASM that occurs at this site. Although MSM vegetation is described from the cSAC, it has not previously been differentiated from ASM, let alone accurately quantified on any vegetation maps of this area. The presence of some MSM vegetation at Keadew, no matter how fragmentary, must be regarded as positive and so the extent is rated as *favourable* (Table 5.1).

Habitat structure and functions

The structure and functions assessment is *favourable* for the MSM. Given the paucity of the habitat at Keadew, monitoring stops were not carried out and the determination of the structure and functions is based solely on a visual estimation. The MSM is neither extensive nor species-rich. Notwithstanding this fact, it can be distinguished from the ASM solely on the presence of Sea Rush.

Future prospects

The future prospects of the habitat are rated as *favourable*. The assessment assumes that the activities and the levels of current impacts do not change in the foreseeable future. Although small in extent, no known activities or impacts are affecting the MSM and it is likely to persist, albeit remain patchy in its distribution at this site.

MANAGEMENT RECOMMENDATIONS

No specific recommendations are made in relation to the management of this site.

REFERENCES

Curtis, T.G.F.C. and 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.

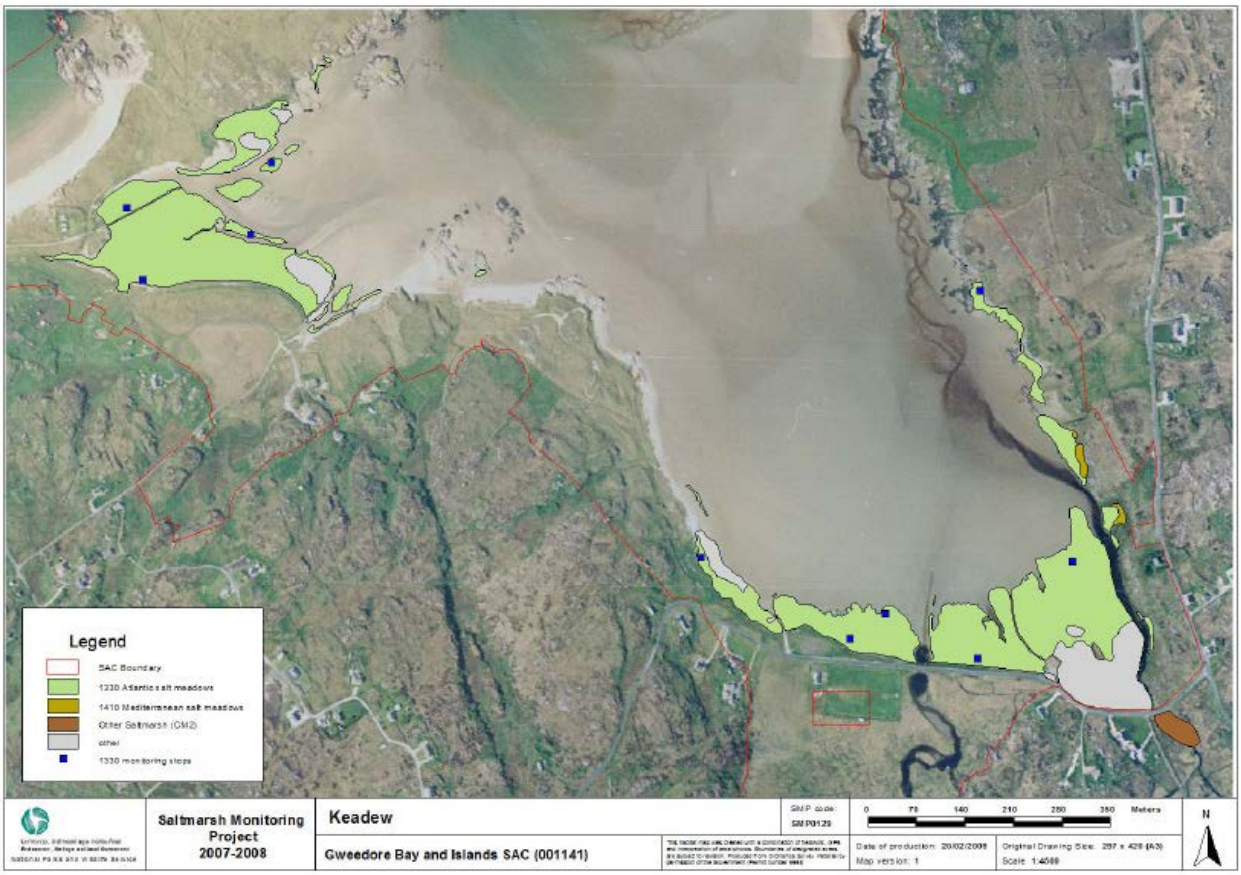
NPWS (Undated).Unpublished Draft *Conservation Plan for Gweedore Bay and Islands cSAC*. Government of Ireland, Unpublished.

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

APPENDIX I

Table 8.1. Areas of SMP habitats mapped using GIS.

SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			H1310	H1330	H1410	H1420	*Spartina* swards
1	1310 *Salicornia* flats						
2	*Spartina* swards						
3	1330 Atlantic salt meadow	9.229		9.229			
4	1410 Mediterranean salt meadow	0.089			0.089		
5	ASM/MSM mosaic (50/50)						
6	ASM/*Spartina* mosaic						
7	1330/other SM (CM2) mosaic						
8	1330/coastal grassland mosaic						
9	Other (non saltmarsh)	1.783					
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)	0.183					
19	1330/rocky shore mosaic						
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	**11.284**		**9.229**	**0.089**		


Legend
SAC Boundary
1330 Atlantic salt meadows
1410 Mediterranean salt meadows
Other Saltmarsh (OM2)
other
1330 monitoring stops
Saltmarsh Monitoring Project 2007-2008
Keadew
Gweedore Bay and Islands SAC (001141)
SMP code: SMP0129
0 70 140 210 280 350 Meters
Date of production: 20/02/2009
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale: 1:4000
N

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

SITE DETAILS

CMP06 site name: **Keadew** CMP06 site code: **153** CMP Map No.: **150**

County: **Donegal** Discovery map: **1** Grid Reference: **B 740 173**

6 inch Map No.: **Do 40 & 41**

Aerial photographs (2000 series): **O 00198 D;O 00199 C;O 00223 B;O 00224A**

NPWS Site Name: **Gweedore Bay and Islands**

NPWS designation: pNHA: **1141** cSAC: **1141**

Ranger Area: **Donegal**

MPSU Plan: **None**

Report Author: **Anne Murray**

SITE DESCRIPTION

Keadew sand dune and machair system is part of the cSAC of Gweedore Bay and Islands, which is located in northwest of County Donegal. The cSAC is a large and diverse coastal site containing large areas of open marine waters, estuarine sand/mud flats, sea cliffs, islands, coastal heath, lake and sand dunes. It also contains relatively smaller areas of habitats including, saltmarsh, deciduous woodland and blanket bog. The transitions between sand dune and heath areas are of particular interest as they support rare habitat types and species-rich assemblages of heath and grassland plant species. The cSAC had been selected for the Annex II plant species *Najas flexilis* (Slender naiad), *Petalophyllum ralfsii* (Petalwort) and the moss *Drepanocladus vernicosus*. The latter has been recorded on the headland at Keadew Point. A number of populations of Red Data plant species have also been recorded in the cSAC recently and include, *Draba incana* (Hoary whitlowgrass), *Pseudorchis albida*, (Small-white orchid) and *Lathyrus japonicus* (Sea pea).

The cSAC provides habitat for the Annex I bird species, *Pyrrhocorax pyrrhocorax* (Chough) – noted at Keadew, *Branta leucopsis* (Barnacle goose), *Pluvialis apicaria* (Golden plover), *Sterna hirundo* (Common tern) and *Sterna paradisea* (Arctic tern). Mammals which frequent the site include *Halichoerus grypus* (Grey seal), *Meles*

meles (Badger), *Lepus timidus hibernicus* (Hare) and the Annex II species *Lutra lutra* (Otter).

The cSAC contains a number of sand dune systems along with Keadew and these were surveyed as individual sites for the purposes of this project, these include; Cruit Lower (CMP site 154), Kincaslough (CMP site 155), Carnboy (CMP site 156), Derrybeg (CMP site 157), Gola Island (CMP site 158) and Lunniagh (CMP site 159).

The cSAC is listed for eight sand dune and machair habitats, four of which are priority EU Annex I habitats. The sand dune habitats recorded at Keadue during this survey include the priority EU Annex I habitats, Machair, Fixed dunes and Decalcified fixed dunes with *Empetrum nigrum*. Other Annex I sand dune habitats recorded are, Dune slack, Mobile dunes and Embryonic dunes and Annual vegetation of driftlines. The total area of sand dune and machair at Keadew is 46ha (excluding 2ha of fixed dune at Portacurry, which has been agriculturally improved).

Keadew sand dunes and machair stretch from the rocky headland of Keadew Point west to Mellamore. Keadew Strand lies sheltered to the east of the headland and is fringed by saltmarsh and wet grassland. Machair overlies the headland and is currently undergrazed and declining in condition. The Annex II plant species *Petalophyllum ralfsii* has been recorded on the headland by D.T. Holyoak (2002). Directly west of the headland is Portacurry beach, it is edged by foredunes grading into lowlying fixed dunes and wet grassland. A rock outcrop at Mallabradagh separates Portacurry beach from the rest of the sand dune system to the west (Mellamore) where low foredunes front a flat machair plain with rocky outcrops throughout. The machair is fenced and is grazed lightly by cattle and donkeys.

Table 153A Areas of EU Annex I habitats mapped at Keadew

EU Code	EU Habitat	Area (ha)
H1210	Annual vegetation of driftlines	0.264
H2110	Embryonic shifting dunes	0.466
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	0.732
H2130	Fixed coastal dunes with herbaceous vegetation	15.683
H2140	Decalcified fixed dunes with *Empetrum nigrum*	0.351
H2190	Humid Dune Slacks	0.005
H21A0	Machair	28.748
	Total Sand dune excluding developments/modifications	**46.249**
	Total Sand dune including developments/modifications	**48.249**

Keadew is popular with summer visitors. The main access routes are at Mellamore in the west of the site where a car park is provided and also in the east of the site where there is a road and track leading to the beach at Portacurry.

Machair (H21A0)

There are two areas of machair at Keadew, one area of machair lies on the headland at Keadew Point and the other occurs west of Portacurry beach at Mellamore. These are separated by fixed dune and wet grassland at Portacurry beach. The total area of machair is 28.748ha.

The machair appears to have been abandoned at Keadew Point as it is very undergrazed and, as a result, is dominated by rank grasses with an understorey of bryophytes. The species diversity is good in places but declining in other parts. Juniper (*Juniperus communis*) is scattered throughout the machair where the sand forms a thin layer overlying the granite rock. The rare liverwort, *Petalophyllum ralfsii* was previously noted in this area in an unshaded low (2cm) moss carpet on damp sand in a small hollow at the edge of the machair. It was searched for on the day of survey but not found. Given the undergrazed nature of the sward, the habitat may no longer be suitable for the liverwort, which is most often found on grazed and disturbed ground.

The machair in the west of Keadew at Mellamore is grazed by cattle and donkeys which has helped to maintain a short sward of between 5 and 15cm. The species diversity is very good with very little agricultural improvement evident. This area of machair grades into fen and freshwater marsh on the landward edge.

A very diverse species was recorded in the machair areas at Keadew and include the following typical species: *Bellis perennis* (Daisy), *Carex arenaria* (Sand sedge), *Carex flacca* (Glaucous sedge), *Carex nigra* (Common 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), *Rhinanthus minor* (Yellow rattle), *Trifolium repens* (White clover) and *Thymus polytrichus* (Wild thyme).

Other species present include the orchids - *Anacamptis pyramidalis* (Pyramidal orchid), *Coeloglossum viride* (Frog orchid), *Gymnadenia conopsea* (Fragrant-orchid), as well as, *Anthyllis vulneraria* (Kidney vetch), *Arabis hirsuta* (Hairy rock-cress), *Campanla rotundifolia* (Harebell), *Daucus carota* (Wild carrot), *Festuca rubra* (Red fescue), *Hypochaeris radicata* (Cat's ear), *Jasione montana* (Sheep's-bit), *Leontodon autumnalis* (Autumn hawkbit), *Luzula campestris* (Field wood-rush), *Polygala vulgaris* (Common milkwort), *Prunella vulgaris* (Selfheal), *Ranunculus acris* (Meadow buttercup), *Rumex acetosella* (Sheep's sorrel), *Succisa pratensis* (Devil's-bit scabious), *Taraxacum* agg (Dandelion), *Trifolium pratense* (Red clover), *Veronica chamedrys* (Germander speedwell) and *Viola tricolor* ssp. *curtisii* (Wild pansy).

The moss and lichen species, *Homalothecium lutescens, Hylocomium splendens, Rhytidiadelphus squarrosus, Rhytidiadelphus triquetrus, Scleropodium purum, Tortula ruraliformis, Peltigera* spp. and *Cladonia* spp were abundant throughout the machair.

Negative indicator species, such as agricultural grasses and weeds were a minor component of the machair grassland with some *Holcus lanatus* (Yorkshire fog) and *Cynosurus cristatus* (Crested dog's-tail) occurring but rare throughout.

Fixed Dunes (H2130)

The main area of fixed dune occurs directly west of Portacurry where it occurs over rocky outcrops in close association with coastal heath. It extends eastward along Portacurry as a low narrow band sweeping up onto the rocky headland of Keadew Point where it edges the seaward side of the machair. Landward, the fixed dune grades into wet grassland and rocky outcrops where a number of dwellings are situated. Saltmarsh fringes the eastern edge of the fixed dunes at Keadew Strand. There is also a band of semi-fixed dunes in the western part of the site, edging the machair at Mellamore**.** The total area of fixed dune at Keadew is 15.683ha.

The areas of fixed dune are generally undergrazed and appear to be retreating landward. The semi-fixed dunes at Mellamore occur as a very narrow band just

outside the fenceline of the machair fields. The fixed dunes at Portacurry are generally used for recreational purposes and are therefore ungrazed.

The fixed dunes species diversity is relatively low at each monitoring stop, overall the typical species include: *Anthyllis vulneraria* (Kidney vetch), *Carex arenaria* (Sand sedge), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Common bird's-foot-trefoil), *Plantago lanceolata* (Ribwort plantain), *Polygala vulgaris* (Common milkwort), *Taraxacum* agg. (Dandelion), *Thymus polytrichus* (Wild thyme), *Trifolium repens* (White clover), *Veronica chamaedrys* (Germander speedwell), *Viola* spp. (Pansy spp.) and mosses -*Calliergonella cuspidata*, *Hylocomium splendens* and *Rhytidiadelphus squarrosus*.

Other species present in the fixed dune include the orchids *Anacamptis pyramidalis* (Pyramidal orchid) and *Gymnadenia conopsea* (Fragrant-orchid) as well as *Ammophila arenaria* (Marram grass), *Centaurea nigra* (Common knapweed), *Daucus carota* (Wild carrot), *Heracleum sphondylium* (Hogweed), *Holcus lanatus* (Yorkshire fog), *Poa annua* (Annual meadow-grass), *Primula* spp. (Primrose spp), *Ranunculus repens* (Creeping buttercup) and *Rumex acetosella* (Sheep's sorrel).

The negative indicator species *Senecio jacobaea* (Common ragwort) occurs occasionally throughout the fixed dunes.

Decalcified fixed dunes with *Empetrum nigrum* (H2140)

A small area of decalcified fixed dunes with *Empetrum nigrum* is found on the rocky outcrop at Mellabradagh, which flanks the western end of Portacurry beach. The heath occurs on sand overlying rock in the transition from fixed dunes to a mosaic of dry grassland, coastal heath and rock. This habitat is very scarce in Ireland, its distribution appears largely affected by climate, with cooler and consistently wetter conditions congenial to its development on acidic sands. Compared to other heath shrubs, the ability of *Empetrum nigrum* to capitalise on renewed surface disturbance on sand dunes, such as shifting sands, may also contribute to its distribution locally. The total area of decalcified fixed dunes with *Empetrum nigrum* is approximately 0.351ha, the habitat is difficult to delineate as it occurs in a mosaic with other heath types. Therefore, the area may be underestimated.

Most of the heath vegetation is dominated by *Juniperus communis* (Juniper), with *Empetrum nigrum* (Crowberry), *Anacamptis pyramidalis* (Pyramidal orchid), *Ammophila arenaria* (Marram grass), *Anthyllis vulneraria* (Kidney vetch), *Carex flacca* (Glaucous sedge), *Dactylorhiza* spp (Orchid spp.), *Daucus carota* (Wild carrot), *Festuca rubra* (Red fescue), *Hypochaeris radicata* (Cat's ear), *Lotus corniculatus* (Common bird's-foot-trefoil), *Plantago lanceolata* (Ribwort plantain), *Succisa pratensis* (Devil's-bit scabious) and *Thymus polytrichus* (Wild thyme). Mosses present include *Hypnum cupressiforme* and *Scleropodium purum*.

No negative indicator species were recorded in this habitat.

Dune Slack (H2190)

A very small area (0.005ha) of dune slack occurs in the western edge of the site at Mellamore. The slack lies in a hollow in fixed dunes located behind a rock outcrop. The species present include, *Agrostis stolonifera* (Creeping bent), *Carex arenaria* (Sand sedge), *Iris pseudacorus* (Yellow iris), *Potentilla anserina* (Silverweed), *Salix repens* (Creeping willow) and *Veronica chamaedrys* (Germander speedwell). The habitat is very rank and in poor condition.

Mobile Dunes (H2120)

A narrow band of mobile dune fronts the machair and semi-fixed dunes at Mellamore. The mobile dunes are in poor condition with an abundance of unhealthy *Ammophila arenaria* (Marram grass) throughout the habitat. This appears to be largely due to natural erosion which is exacerbated by recreational activities. Another band of mobile dunes occur at Portacurry. These are building from recycled sand of the eroding dunes and machair. Both areas of mobile dunes are impacted by trampling from visitors to the dunes and beach. The total area of mobile dunes at Keadew is 0.732ha (Table 153A).

The mobile dunes are dominated by the typical species *Ammophila arenaria* (Marram grass) and *Leymus arenarius* (Lyme grass). Other species present include *Heracleum sphondylium* (Hogweed) and *Eryngium maritimum* (Sea holly). There are no negative indicator species in the mobile dunes.

Embryonic Dunes (H1220)

The embryonic dunes front the mobile dunes at Mellamore and at Portacurry. Their development is limited and they occur on the steep front mobile slopes where they are exposed to storm-wave erosion as the shoreline progressively retreats. The area of embryonic dunes is 0.466ha (Table 153A).

The embryonic dunes comprise a very thin band of the typical species, *Elytrigia juncea* (Sand couch) and *Leymus arenarius* (Lyme grass) interspersed with strandline species including *Honckenya peploides* (Sea sandwort) and *Atriplex* spp. (Orache spp.). There are no negative indicators in the embryonic zone.

Annual Strandline (H1210)

The annual vegetation of strandline occurs on sand along the beach west of Portacurry towards Mellamore. The area of strandline totals 0.264ha (Table 153A).

The typical species of annual strandline at Keadew are *Atriplex prostrata* (Spear-leaved orache) and *Honckenya peploides* (Sea sandwort). No negative indicator species were recorded in the habitat. The beach is not mechanically cleaned and the main impact on the habitat is natural erosion which is compounded by recreational activities.

IMPACTS

The impacts at Keadew are listed in Table 153B. There is easy access to the site by road to Portacurry on the eastern side and a car park is located in the southwest of the site at Tullyillan. The quiet cove at Mellamore makes it ideal for swimmers and bathers, however access onto the beach is via a track, an old right of way which has been left in disrepair, in an effort to discourage visitors passing through privately owned land. The formal car park provided further south is separated from the beach at Mellmore by high rocky ground with a number of private dwellings and access across this ground is difficult. Access to Portacurry in the eastern part of the site is easier and visitors tend to concentrate at this end of the site. Heavy trampling (code 720) associated with visitors gaining access to the beach for activities such as walking (code 622), swimming, sun bathing and/or picnicking, is evident from the number of tracks at Portacurry.

Table 153B Intensity and impact of various activities on sand dune habitats at Keadew

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha[2]	Location of Activity[5]
H21A0	103	B	-1	1	Inside
H2130	103	B	-1	0.5	Inside
H21A0	140	A	+1	20	Inside
H2130	140	A	+1	10	Inside
H2140	140	A	+1	0.3	Inside
H21A0	143	B	-1	5	Inside
H21A0	141	B	-1	6	Inside
H2130	141	B	-1	3	Inside
H2130	143	B	-1	2	Inside
H21A0	149	B	-1	10	Inside
H2130	149	B	-1	5	Inside
H21A0	150	A	-1	15	Inside
H2130	150	A	-1	3	Inside
H21A0	171	C	-1	1	Inside
H2130	622	A	-1	5	Inside
H2120	622	A	-1	0.3	Inside
H2110	622	A	-1	0..1	Inside
H1210	622	A	-1	0.1	Inside
H2120	900	A	0	Unknown	Inside
H2130	900	A	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

More dispersed light trampling is impacting positively throughout the rank fixed dunes by providing disturbance and increasing habitat diversity at Mellamore.

The machair has been strip fenced (code 150) and grazing (code 140) of the machair fields by donkeys and cattle (in the western part of the site) is impacting positively on the sward. There is some disturbance of the machair surface due to trampling by the animals, however this is minor. The fixed dunes and machair in the eastern part of the site are impacted by undergrazing (code 149) due to the absence of stock grazers and the low population of rabbits. This has resulted in a gradual decline in the quality of the fixed dune and machair, where there is a predominance of rank grasses and low species diversity. The introduction of a grazing regime for this site would require consideration of the recreational activities of the site but would improve the condition of this habitat, including the area at Keadew Point where Petalwort has been recorded.

Sand extraction (code 300) has been recorded in the fixed dunes during the machair survey (Crawford *et al.*, 1996) and it would appear that this practice has continued.

Natural erosion (code 900) is currently impacting the strandline and dunes at Keadew. The dunes are undergoing coastal retreat as evidenced by the eroded face of fixed dunes and the steep front slopes of the mobile dunes.

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 NATURA 2000 survey and the 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 Machair study (1996) as the NVC habitat classification was used to describe the machair system.

Table 153C Conservation status of Annex I sand dune habitats at Keadew

Habitat[1]	**EU Conservation Status Assessment**				
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**	**Overall EU conservation status assessment**	**Proposed Irish conservation status system**[2]
Machair (21A0)	Extent/ Structure and functions	Future prospects		Unfavourable - Inadequate	Unfavourable-unchanged
Fixed Dunes (H2130)	Extent/ Structure and functions	Future prospects		Unfavourable - Inadequate	Unfavourable-declining
Decalcified fixed dunes with *Empetrum nigrum* (H2140)	Extent/ Structure and functions/ Future prospects			Favourable	Favourable-maintained
Mobile Dunes (H2120)	Extent	Structure and functions Future prospects		Unfavourable - Inadequate	Unfavourable-unchanged
Embryonic Dunes (H2110)	Extent/ Structure and functions	Future prospects		Unfavourable - Inadequate	Unfavourable-unchanged
Annual vegetation of driftlines	Extent/ Structure and 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 153D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Keadew

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Machair (H21A0)	8	0	**Favourable**
Fixed Dunes (H2130)	4	0	**Favourable**
Decalcified fixed dunes with *Empetrum nigrum* (H2140)	1	0	**Favourable**
Mobile Dunes (H2120)	3	1	**Unfavourable-inadequate**
Embryonic Dunes (H2110)	1	0	**Favourable**
Annual vegetation of driftlines (H1210)	1	0	**Favourable**

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 sand dune and machair habitats at Keadew are given in Table 153C.

Machair (H21A0)

The extent of machair is rated as *favourable* (Table 153C). This assessment is based on comparisons between the previous studies of extent of sand dune/machair – NATURA maps and the 1996 Machair Survey – and the current extent. There is no apparent decline in extent of the machair.

The structure and functions parameter is rated as *favourable*. Eight monitoring stops were placed in the machair area and all of these passed (Table 153D). The machair fields are lightly grazed mainly by cattle and donkeys but are undergrazed in places, most notably at Keadew Point, where grazing has been abandonned. The one attribute that failed in the monitoring stops at Keadew Point was sward height.

The conservation status for structure and functions in the NATURA 2000 form concentrates on other machair sites within the cSAC and identifies overgrazing as a main threat to the habitat. However, the opposite is currently the case at Keadew. Eight monitoring stops were placed in the machair area during this survey and all of these passed (Table 153D). The machair fields are lightly grazed mainly by cattle and donkeys but are undergrazed in places, most notably at Keadew Point, where grazing

has been abandoned. The one attribute that failed in the monitoring stops at Keadew Point was sward height.

The assessment criteria used for monitoring stops of the current survey were applied to the data contained in four of the relevés placed in the machair during the Biomar Survey of Irish Machair Sites (Crawford *et al*., 1996). Four of the monitoring stops were located in the vicinity of these four relevés of the Biomar Survey. Two of the relevés were situated at Mellamore and two more at Keadew Point. The two relevés at Keadew Point passed overall but one failed on sward height, similar to the results of the monitoring stops of this survey. The two relevés placed at Mellamore passed overall but the typical species diversity appears to have been lower in 1996. This may indicate that the current grazing intensity has improved the sward diversity here.

The future prospects for this site are considered *unfavourable-inadequate* on the basis that the machair is undergrazed at Keadew Point and it is likely that this will continue to impact negatively on the machair habitat. There is currently no conservation plan available for this cSAC, however if an appropriate grazing regime was implemented, it is likely that the machair would recover quickly. This area also contains Petalwort and therefore any future management plans for the site should take this into consideration.

The overall EU conservation status of the machair is considered *unfavourable-inadequate* (Table 153C). This is largely attributable to undergrazing at Keadew Point.

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

Fixed Dunes (H2130)

The extent of fixed dunes is rated as *unfavourable-inadequate* (Table 153C). Sand extraction has occurred in the past and has caused erosion of part of the fixed dune reducing extent. Natural erosion is also evident along the edge of the fixed dunes in places however, this is not considered unfavourable.

The structure and functions parameter is rated as *favourable*. Four monitoring stops were placed in the fixed dunes and all of these passed (Table 153D). However the fixed dunes are impacted by undergrazing and the sward is tall in places with low species diversity.

The future prospects of the fixed dunes at Keadew are considered *unfavourable-inadequate*. This is attributable to the lack of grazing which will lead to a decline in the condition of the habitat. There is currently no conservation plan available for the site. However, if an appropriate grazing regime is implemented, the habitat would improve. Sand extraction at the site is also a continuing pressure at this site.

The fixed dunes at Keadew are not mentioned in the NATURA 2000 survey. Currently, the overall EU conservation status of fixed dune is *unfavourable-inadequate* (Table 153C). This rating is attributable to the undergrazing and sand extraction.

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

Decalcified fixed dune with *Empetrum nigrum* (H2140)

The extent of decalcified fixed dune with *Empetrum nigrum* is rated as *favourable* (Table 153C). This assessment is based on best scientific judgement as the habitat apppears intact. There is no previous reliable information on the extent of this habitat at Keadew.

The structure and functions parameter is rated as *favourable* (Table 153D). One monitoring stops were placed in the *Empetrum* dune heath and this passed based on trial assessment criteria (see main report). The heath appears to be wind shorn and very lightly grazed, it is in good condition with a good cover of heathers and no negative indicator species.

The future prospects for this site are considered *favourable*. There are no signs of significant disturbance in the areas of heath and it appears relatively intact. There is some trampling of the heath due to its close proximity to Portacurry beach however the impact is minor.

The overall EU conservation status of decalcified fixed dune with *Empetrum nigrum* is *favourable* (Table 153C). This is based on a trial assessment for this habitat, as it requires further research.

The Irish conservation status is rated as *favourable-maintained*. This rating is attributable to the seemingly good condition of the habitat.

Dune Slack (H2190)

Dune slack is not assessed given the very small and confined area of this habitat.

Mobile Dunes (H2120)

The extent of the mobile dunes is rated as *favourable* (Table 153C). This is based upon best scientific judgement as there is no previous information on the extent of the habitat at Keadew. The mobile dunes are undergoing natural erosion, a process that is not considered as unfavourable in relation to extent of habitat.

The structure and functions parameter is rated as *unfavourable-inadequate*. A total of 4 monitoring stops were placed in the mobile dunes and one of these failed (Table 153D). The mobile dunes are impacted by natural erosion and this is exacerbated by trampling by visitors.

The future prospects of this habitat are considered *unfavourable-inadequate*. The greatest impact on the mobile habitat is natural erosion and trampling from walkers. Visitor use of the dunes at Keadew is unmanaged and this has encouraged widespread trampling of the dunes. The provision of a formal route onto the beach (at Portacurry) would alleviate some of the pressure. It is likely that future pressures on this site will relate to a greater level of interference of the foredunes to protect property and the amenity value of the beach from the retreating coastline. This will perhaps result in applications for the installation of coastal protection.

The overall EU conservation status of mobile dunes at Keadew is *unfavourable-inadequate* (Table 153C). This rating is attributable to the negative impacts of trampling on the natural process of erosion.

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

Embryonic Dunes (H2110)

The extent of the embryonic habitat is rated as *favourable* (Table 153C). This is based on best scientific judgement as there is no information on the extent of the habitat at Keadew from previous studies. There appears to be no current impact on the extent with the exception of natural erosion which is not considered unfavourable.

The structure and functions parameter is rated as *favourable*. Due to GPS problems on the day of survey, only one monitoring stop was placed in the embryonic habitat and this passed (Table 153D). However, it was noted that the remainder of the habitat is in good condition. Where embryonic habitat occurs, it is dominated by healthy typical embryonic species *Elytrigia juncea* (Sand couch) and *Leymus arenarius* (Lyme grass), with no negative indicator species present. The impact of natural erosion is apparent, as most of the embryonic zone is narrow and overlying steep mobile slopes.

The future prospects of the embryonic habitat are considered *unfavourable-inadequate*. Similar, to the mobile dunes this habitat is under pressure from natural erosion and recreational activities.

The present overall EU conservation status for embryonic dunes is considered *unfavourable-inadequate*.

The overall Irish conservation status is *unfavourable-unchanged* (153C).

Annual vegetation of strandlines (H1210)

The extent is rated as *favourable* as there is no evidence of a decline in this habitat. Cleaning of the beach appears to be carried out manually. Therefore, most of the nutrients, organic matter and seed sources, necessary for the maintenance of the strandline vegetation, are retained within the system, however some of it may be lost to winter storms.

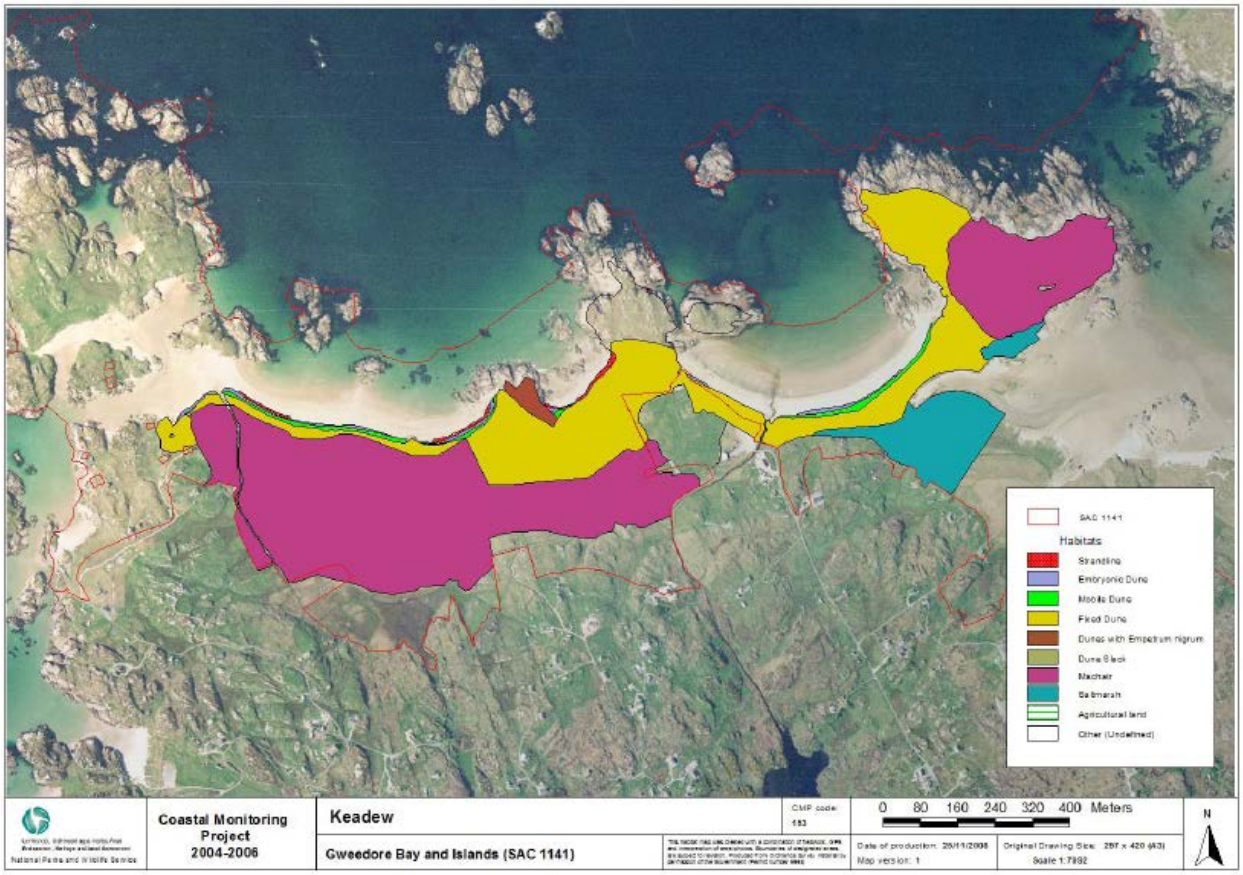
The structure and functions parameter is rated as *favourable*. Only one monitoring stop was placed in the strandline due to problems with equipment on the day of

survey and this stop passed. Overall, habitat appears to be functioning well, with at least two annual strandline species present on the day of survey.

The future prospects for this site are considered *favourable.* The main pressure on this habitat in the future may be from natural processes, such as winter storms and natural erosion.

The overall EU conservation status of the strandline habitat is considered *favourable* The assessment of the EU conservation status of a habitat that is ephemeral in nature is not exact. The total area of the strandline will vary from year to year and its location may also shift in response to coastal processes.

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


SAC 1141
Habitats
Strandline
Embryonic Dune
Mobile Dune
Fixed Dune
Dunes with Empetrum nigrum
Dune Slack
Machair
Saltmarsh
Agricultural land
Other (Undefined)
Coastal Monitoring Project 2004-2006
Keadew
Gweedore Bay and Islands (SAC 1141)
CMP code: 183
0 80 160 240 320 400 Meters
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:7892
N

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

SITE DETAILS

CMP06 site name: **Cruit Lower** CMP06 site code: **154** CMP Map No.: **151**

County:**Donegal** Discovery map: **1** Grid Reference: **B730 210**

6 inch Map No.: **Dg 040**

Aerial photographs (2000 series): **O 0174-A, C; O 0198-B; O 019-A, B, C, D.**

NPWS Site Name: **Gweedore Bay and Islands**

NPWS designation: pNHA: **1141** cSAC: **1141**

Ranger Area: **West**

MPSU Plan: **No**

Report Author: **Melinda Swann**

SITE DESCRIPTION

Cruit Island is part of the Gweedore and Islands cSAC 1141, which extends from Bloody Foreland to Burtonport in Donegal. The islands include Inishirrer, Inishmeane, Umfin, Inishfree Lower, Owey, Cruit and Gola. Cruit (CMP site code 154) and Gola (158) are part of seven sand dune sites which have been surveyed during the current survey, these are dealt with individually within the Coastal Monitoring Project 2006 Report. The other sites are on the mainland and include Keadew (153), Kincaslough (155), Carnboy (156), Derrybeg (157) and Lunniagh (159). This cSAC is noteworthy both for its size (extends for 16km along the coast) and for its ecological diversity. The Annex I sand dune habitats for which the cSAC is designated include 'Machair', 'Humid dune slacks', 'Dunes with *Salix repens'*, 'Atlantic decalcified fixed dunes (Calluno-Ulicetea)', 'Decalcified fixed dunes with *Empetrum nigrum'*, 'Fixed dunes with herbaceous vegetation (Grey dunes)', 'Shifting dunes along the shoreline with *Ammophila arenaria'*, 'Embryonic dunes' and 'Perennial vegetation of stony banks'. The other Annex I habitats for which the cSAC has been designated include '*Juniperus communis* formations on calcareous heaths or grasslands', 'Alpine and sub-alpine heaths', 'Dry heaths', 'Oligothrophic lakes

containing very few minerals of sandy plains (Littorelletalia-Uniflorae)', 'Mediterranean salt meadows', 'Atlantic salt meadows', 'Reefs and Lagoons'.

Although they may not occur at Cruit the Annex II plant species *Najas flexilis* (Mullaghmore Lough & Lough Ibby), *Drepanocladus vernicosus* (Kincaslough) and *Petalophyllum ralfsii* (Keadew) and three Red Data Book species, *Draba incana* (Hoary whitlow-grass), *Pseudorchis albida* (Small white orchid) and *Lathyrus japonicus* (Sea pea) have been recorded at other sites within the cSAC.

The cSAC also supports a number of Annex I bird species including *Pyrrhocorax pyrrhocorax* (Chough) (up to 40 individuals may be seen in the winter (BirdWatch Ireland pers comm., 2007)), *Branta leucopsis* (Barnacle goose), *Pluvialis apicaria* (Golden plover), *Crex crex* (Corncrake), *Falco Peregrinus* (Peregrine falcon) as well as *Sterna hirundo* (Common tern) and *Sterna paradisea* (Arctic tern). Mammals that occur within the cSAC include *Halichoerus grypus* (Grey seal), *Meles meles* (Badger), *Lepus timidus hibernicus* (Mountain (Irish) hare), *Mustela erminea* (Stoat) and the Annex II species *Lutra lutra* (Otter), as well as amphibians such as *Rana temporaria* (Common frog).

Cruit Lower is located in an area known as Cruit Sound, which is southwest of Kincaslough and north of Keadew. A substantial area of the northern part of the fixed dune has been taken over by a golf course (24.8ha) and therefore is a popular amenity area. There are a number of beaches located at the site and all are popular destinations for holiday makers during the summer months. A few holiday villages are located near to the beaches in the south of Cruit Lower.

Cruit Lower is interesting as it is mostly composed of a mosaic of extensive sandy substrates intermixed with heath and exposed rock habitats. As a result a number of Annex I priority sand dune habitats occur on the island including machair, fixed dunes with herbaceous vegetation and decalcified fixed dunes with *Empetrum nigrum.* The island is mainly ungrazed and as a result the habitats are beginning to decline in species diversity as competition between species occurs. In many areas there is now rank vegetation and in time a decline in condition of the habitats may occur unless grazers are introduced. The habitats are also under considerable pressure as a result of

holiday homes and from the presence of the golf course, which has already had a dramatic effect on some habitats such as the fixed dunes and dunes slacks.

The current survey concentrates on Annex I sand dune habitats found at Cruit Lower and include machair, fixed dunes, humid dune slacks, dunes with *Salix repens*, decalcified dunes with *Empetrum nigrum*, mobile dunes, embryonic dunes and strandline. The areas of Annex I sand dune habitats recorded at Cruit are shown in Table 154A.

Table 154A Areas of EU Annex I habitats mapped at Cruit

EU Code	EU Habitat	Area (ha)
H21AO	Machair	9.6
H2130	Fixed Dunes	32
H2190	Humid Dune Slacks	0.6
H2170	Dunes with *Salix repens*	1
H2150	Atlantic decalcified fixed dunes (Calluna-Ulicetea)	3.6
H2140	Decalcified fixed dunes with *Empetrum nigrum*	0.6
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	2
H2110	Embryonic Dunes	1.3
H1210	Annual Strandline	0.9
	Total Sand dune excluding developments/modifications*	**51**
	Total Sandy substrate area including developments/modifications	**76.3**

*Developments in this case include golf course (24.8ha), houses (approx. 0.4ha) and a car park at the golf course (0.11ha)

Machair (H21AO)

The machair habitat comprises 9.6ha (approximately 19%) of the total sand dune habitat at Cruit Island (Table 154A). The machair is located in the southeastern part of Cruit Island and is surrounded by a mosaic of outcropping rock and coastal grassland to the south and west and by fixed dune to the north. It is a gently undulating, low-lying plain, which is surrounded by higher ground on all sides. It is situated behind a sandy beach, Cruit strand which has a rocky headland at the north end and an accreting spit to the south end. The spit is composed of a band of fixed dune, mobile dune and embryonic dune. There is a patch of dune heath (decalcified dunes with *E. nigrum*) and rocky outcrop mosaic to the south of the accreting spit, which is bounded by the machair. Grazing is a key component in machair habitats as the presence of large grazers leads to the characteristic short sward appearance. No grazing leads to an increase in sward height and a loss of species diversity. At present the machair is not grazed at Cruit Island and as a result the sward is quite tall. Species diversity is generally quite low (although some areas show relatively good species richness) and in some places rank patches of vegetation have developed. These are dominated by

Festuca rubra (Red fescue) and a small number of moss species usually dominate with very few herb species. Furthermore, towards the front of the machair habitat *Ammophila arenaria* (Marram grass) dominates the vegetation and is encroaching inland. There are tracks across the machair, which have formed as people walk across the habitat (not badly worn) and in these areas the species diversity is higher, indicating that some trampling leads to a higher diversity of species. From the aerial photographs for the site (2000 series) it is apparent that there was a tendency for cars to park at the edge of the machair, especially at the northern end of the beach. A fence has subsequently been erected here which has deterred this practice to some extent, but there are still some cars using the area for parking in order to access the beach. At the front of the machair here, slumping of the vegetation, onto the beach has occurred as a result of natural erosion and there are no foredunes. Parking of cars and trampling the vegetation in order to enter the beach is most likely exacerbating the erosion here. Foredunes are present further south along Cruit strand in front of the machair and continue until the accreting tip. Beyond the tip there is a single band of embryonic dunes but no mobile dunes.

The typical species found in the machair at Cruit include *Lotus corniculatus* (Common bird's-foot trefoil), *Galium verum* (Lady's bedstraw), *Plantago lanceolata* (Ribwort plantain), *Carex arenaria* (Sand sedge), *Thymus polytrichus* (Wild thyme), *Trifolium repens* (White clover), *Prunella vulgaris* (Selfheal), *Carex flacca* (Glaucous sedge), *Rhinanthus minor* (Yellow-rattle), *Carex nigra* (Common sedge), *Anacamptis pyramidalis* (Pyramidal orchid) and *Gymnadenia conopsea* (Fragrant orchid). The following typical species were also found on the short turf beside tracks, *Euphrasia officinalis agg.* (Eyebright), *Dactylorhiza* spp. (Marsh orchid) and *Cerastium fontanum* (Common mouse-ear).

Other species of the machair include *Festuca rubra* (Red fescue), *Ammophila arenaria* (Marram grass), *Ranunculus repens* (Creeping Buttercup), *Listera ovata* (Common twayblade), *Rumex acetosella* (Sheep's sorrel), *Poa* spp., (Meadow-grass spp.), *Arrhenatherum elatius* (False oat-grass), *Holcus lanatus* (Yorkshire-fog) *Centaurea nigra* (knapweed), *Silene uniflora* (Sea campion), and *Taraxacum agg.* (Dandelion). Also found beside the tracks were species such as *Pillosella officinarum*

(Mouse-ear hawkweed), *Campanula rotundifolia* (Harebell) and *Daucus carota* (Wild carrot).

Mosses recorded on the machair include *Rhytidiadelphus squarrosus, Hylocomium splendens, Scleropodium purum* and *Calliergonella cuspidata*.

No negative indicators were recorded.

Fixed Dunes (H2130)

The fixed dune habitat comprises 32ha (approximately 63%) of the total sand dune habitat at Cruit Island (Table 154A). The fixed dune habitat forms two discrete areas on Cruit Island. The first area is located just north of the machair and the second area is located further north beside Lake Scalpachore. They are separated by a coastal heath/bog and outcropping rock mosaic. The fixed dunes located north of the machair are intermixed with outcropping rock and a mosaic of siliceous heath and patches of decalcified dunes with *Empetrum nigrum* (dune heath). The vegetation in this part of the fixed dunes was quite closed in appearance with a dominance of *Ammophila arenaria* (Marram grass). A small patch of *Hippophae rhamnoides* (Sea buckthorn) was noted in the eastern part of the fixed dunes. No grazing occurs in the fixed dunes at Cruit.

The fixed dunes near Lake Scalpachore extend north all the way to the end of the island encompassing the golf course. The lake itself is surrounded by a stand of *Phragmites australis* (Common reed) and there are areas of bog and saltmarsh nearby. The saltmarsh has been cut off from the sea by the development of foredunes. There is also a small area of dunes with *Juniperus communis* (dune heath) to the east of the fixed dunes, as well as a mosaic of dunes with *Salix repens* (Creeping willow), heath and dry grassland in the north east of the habitat. The fixed dunes in this part of the island are also quite closed in appearance and very rank. Species diversity is low to fair as a result and it is difficult to walk through the habitat, especially in the south around the lake where *Rosa pimpinellifolia* (Burnet rose) is predominant. There are some wind eroded bare ridges, but are not extensive. A substantial area of the fixed dune in the northern part of the island has been modified into the golf course (Cruit Island Golf Course). The golf course was opened in 1986 and therefore is relatively

new. It is a nine-hole golf course, with 18 tee boxes (i.e. two sets of tees playing into each hole) (Gaynor & Browne, 1999). According to the Survey of Irish links golf courses (Gaynor & Browne, 1999) the golf course still maintained a good diversity of species-rich habitats and was not as intensively managed as other golf courses at the time of the survey. It also noted that the club had not developed all the land in the southern part of its ownership. However it cited the main impacts as topographical alterations, reseeding, fertilisation and mowing of the tees, greens and fairways. It was also mentioned in the report that there was a dune slack located nearby to the 1st green. During the current survey it was noted that this slack was still mainly intact but that there was bracken nearby which may encroach further on the habitat. No monitoring stops were placed in the habitat as it was within the boundary of the golf course. The dune slack is next to the sign at the entrance to the golf course and is indicated by an information point on the habitat map. It was also noted that it seems that approximately 25% of the golf course still remains unmanaged. The golf club has expanded though into the fixed dunes in some places by as much as 4 hectares.

The typical species found in the fixed dune at Cruit include *Festuca rubra* (Red fescue), *Hypochaeris radicata* (Cat's-ear), *Pillosella officinarum* (Mouse-ear hawkweed), *Lotus corniculatus* (Common bird's-foot trefoil), *Galium verum* (Lady's bedstraw), *Plantago lanceolata* (Ribwort plantain), *Thymus polytrichus* (Wild thyme), *Carex arenaria* (Sand sedge), *Cerastium fontanum* (Common mouse-ear), *Euphrasia officinalis* agg. (Eyebright), *Campanula rotundifolia* (Harebell), *Anthyllis vulneraria* (Kidney vetch), *Viola* spp., (Violet spp.), *Viola riviniana* (Common dog-violet), *Centaurium erythraea* (Common centaury), *Prunella vulgaris* (Selfheal), *Trifolium repens* (White clover), *Linum catharticum* (Fairy flax) and *Arrhenatherum elatius* (False oat-grass).

Other species found in the fixed dune include *Silene uniflora* (Sea campion), *Ammophila arenaria* (Marram grass), *Daucus carota* (Wild carrot), *Armeria maritima* (Thrift), *Succisa pratensis* (Devil's bit-scabious), *Holcus lanatus* (Yorkshire fog), *Rosa pimpinellifolia* (Burnet rose), *Angelica sylvestris* (Wild angelica), *Hieracium* spp. (Hawkweed) *Tussilago farfara* (Colt's-foot), *Jasione montana* (Sheep's bit), *Primula vulgaris* (Primrose), *Rumex acetosella* (Sheep's sorrel), *Bellis perennis* (Daisy), *Listera ovata* (Common twayblade), *Anacamptis pyramidalis* (Pyramidal

orchid), *Carex nigra* (Common sedge) and *Empetrum nigrum* (Crowberry) on rocky outcrops.

Mosses found in the fixed dune habitat include *Rhytidiadelphus squarrosus, Scleropodium purum, Calliergonella cuspidata, Homalothecium* spp., *Tortula ruraliformis* and the typical moss *Hypnum cumpressiforme.*

The negative indicators recorded include *Senecio jacobaea* (Common ragwort), *Cirsium* spp. (Thistle), *Hippophae rhamnoides* (Sea buckthorn), *Dactylis glomerata* (Cock's-foot) and *Pteridium aquilinum* (Bracken).

Dune Slack (H2190)

The dune slack habitat comprises 0.6ha (approximately 1.2%) of the total sand dune habitat at Cruit Island (Table 154A). Two dune slacks were found during the current survey. One was a dry mature slack, which was located in the fixed dune just southwest of the golf course. The other slack was present at the entrance to the golf course on the right hand side of the road. This slack however was outside the boundary of the cSAC and was therefore not monitored. The slack which was monitored was approximately 0.34ha in size and was composed mainly of a bushy stand of *Salix repens* (Creeping willow) as well as an abundance of grasses such as *Dactylis glomerata* as well as a high percentage cover of *Pteridium aquilinum* (Bracken) and *Rosa pimpinellifolia* (Burnet rose). The lack of grazing means that the bracken and Burnet rose may take over leading to a decline in the species richness. The slack may be drying out as a result of the presence of the golf course causing a change to the overall water table in the fixed dunes. On the fixed dunes surrounding this dune slack, there are fine examples of extensive mats of *Peltigera* lichens. The lichens give the characteristic greyness to the dunes from which the name 'Grey dunes' is derived. Some areas of the fixed dune slopes, beside the slack were previously eroded and were re-vegetating with species such as *Tortula ruraliformis, Sedum acre* (Biting stonecrop), *Juniperus communis* (Juniper), *Peltigera* spp. lichens, *Cladonia* spp. lichens and *Campanula rotundifolia* (Harebell) as well as a number of other fixed dune species already mentioned in the fixed dune section. There is a small patch of *S. repens* (Creeping willow) on the slopes beside the slack.

The typical species found in the dune slack include *Carex* arenaria, (Sand sedge), *Holcus lanatus* (Yorkshire fog), *Galium verum* (Lady's bedstraw), *Plantago lanceolata* (Ribwort plantain), *Salix repens* (Creeping willow), which formed a bushy canopy and *Festuca rubra* (Red fescue).

Other species present include *Rosa pimpinellifolia* (Burnet rose), *Ammophila arenaria* (Marram grass), *Primula vulgaris* (Primrose), *Ranunculus repens* (Creeping Buttercup) and *Angelica sylvestris* (Wild angelica).

The moss *Hypnum cumpressiforme*, which is a typical species found in fixed dunes was also recorded.

The negative indicators recorded in the habitat include *Dactylis glomerata* (Cock's-foot) and *Pteridium aquilinum* (Bracken).

Dunes with *Salix repens* (H2170).

The habitat comprises 1ha (approximately 1.2%) of the total sand dune habitat at Cruit Island (Table 154A). Three areas of dunes with *S repens* (Creeping willow) were found on Cruit Island during the current survey. One small patch was found in the southern section of the fixed dunes, this was monitored but was too small to map. A larger area was found in the northeast of the site above the golf course. This is located on a slope, intermingled with fixed dune and rocky outcrops as well as heath and dry grassland, which extends to the seaward edge of the eastern part of the site. A small patch is also found on the fixed dune slope, above the dry mature dune slack, but was too small to map.

The typical species *Carex arenaria* (Sand sedge), *Euphrasia officinalis agg.* (Eyebright), *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Common bird's-foot trefoil), *Festuca rubra* (Red fescue), *Carex flacca* (Glaucous sedge) and *Salix repens*, (Creeping willow) are found in the habitat.

Other species present in the habitat include *Thymus polytrichus* (Wild thyme), *Cerastium fontanum* (Common mouse-ear), *Daucus carota* (Wild carrot), *Anthyllis vulneraria* (Kidney vetch), *Plantago lanceolata* (Ribwort plantain), *Ranunculus*

repens (Creeping Buttercup), *Linum catharticum* (Fairy flax), *Ammophila arenaria* (Marram grass), *Primula vulgaris* (Primrose), *Succisa pratensis* (Devil's bit-scabious), *Trifolium repens* (White clover), *Prunella vulgaris* (Selfheal), *Viola* spp., (Violet spp.), *Holcus lanatus* (Yorkshire fog) and *Schoenus nigricans* (Black bog-rush), which accounted for 10% of the habitat in the northeast of the site. *Polygala vulgaris* (Common milkwort), *Listera ovata* (Common twayblade) and *Gymnadenia conopsea* (Fragrant orchid) were found in the southern part of the island along with a number of the species mentioned above.

The moss species present were *Rhytidiadelphus squarrosus* and *Hypnum cumpressiforme*.

The negatives indicator *Dactylis glomerata* (Cock's-foot) was recorded in the habitat.

Atlantic decalcified dunes (Calluno-Ulicetea) (H2150)

The habitat comprises 3.6ha (approximately 7%) of the total sand dune habitat at Cruit Island (Table 154A). The main area of this habitat was found in the east of the fixed dunes just below the main entrance to the golf course. Here the habitat slopes from the main road down to the rocky shoreline. It is quite rank in appearance with some *Juniperus communis* (Juniper) and *Rosa pimpinellifolia* (Burnet rose) present but grasses dominate the sward including *Festuca rubra* (Red fescue), *Arrhenatherum elatius* (False oat-grass), *Ammophila arenaria* (Marram grass) and *Holcus lanatus* (Yorkshire fog). As the habitat was so rank, the boundary between this habitat and the fixed dunes was difficult to find and therefore, the area mapped is an overestimate.

The dwarf shrub *Juniperus communis* (Juniper) accounted for 70% of the dwarf shrubs present in the patch. *Rosa pimpinellifolia* (Burnet rose) was also found. Forb species, which may be typical, include *Plantago lanceolata* (Ribwort plantain), *Lotus corniculatus* (Common bird's-foot trefoil) and *Viola* spp., (Violet spp.) and possible typical grass species present include *Festuca rubra* (Red fescue) and *Ammophila arenaria* (Marram grass). It is apparent from the above species that this area does not fit directly into the Calluna heath community, therefore this area of Cruit warrants further investigation during any future dune heath studies.

Other forbs found include *Galium verum* (Lady's bedstraw) and the grass *Arrhenatherum elatius* (False oat-grass). Mosses present include *Homalothecium* spp., and *Hypnum cumpressiforme.* The grass *Holcus lanatus* (Yorkshire fog), which may be a negative indicator accounted for 30% cover of the habitat.

Decalcified Dunes with *Empetrum nigrum* (H2140)

This habitat has been little studied within the Irish context and as a result the monitoring process used during the current survey is on a trial basis and typical species may change in the future as more of an understanding of the habitat is gained (See main report). The habitat comprises 0.6ha (approximately 1.2%) of the total sand dune habitat at Cruit Island (Table 154A).

There is an area of the habitat found in association with outcropping rock in the eastern part of the machair. Difficulty arises when classifying this habitat as in many cases it may be thought that the presence of heath species near rock is simply as a result of the siliceous influence of the rock. Therefore it is important to determine whether there are sand-loving species in the vicinity, which would indicate a mix of sand with the peaty substrate. This area was mapped as siliceous heath on the day of survey but when a second look was taken at the species list, post fieldwork and as there were sand species such as *Carex arenaria* (Sand sedge) and *Ammophila arenaria* (Marram grass), it was deemed to be a mosaic of siliceous rock and dunes with *Empetrum nigrum*. No monitoring stops were placed in this area, but a species list was taken. The area should be further surveyed in the future.

The possible typical species for the habitat found in this area of Cruit Island include *Empetrum nigrum* (Crowberry), *Arctostaphylos uva-ursi* (Bearberry), *Erica cinerea* (Bell heather), *Calluna vulgaris* (Ling heather), *Carex arenaria* (Sand sedge) and *Ammophila arenaria* (Marram grass) as well as *Salix repens* (Creeping willow) and *Juniperus communis* (Juniper).

Other species include *Succisa pratensis* (Devil's bit-scabious), *Jasione montana* (Sheep's bit), *Pillosella officinarum* (Mouse-ear hawkweed), *Thymus polytrichus* (Wild thyme), *Campanula rotundifolia* (Harebell), *Anthyllis vulneraria* (Kidney

vetch), *Linum catharticum* (Fairy flax), *Leontodon autumnalis* (Autumn hawkbit), *Dactylorhiza* spp., (Marsh orchid spp.) and *Schoenus nigricans* (Black bog-rush).

There are a number of other small patches of this habitat scattered amongst the fixed dunes in both the north and south of Cruit Island. Some patches were very small and were therefore not possible to map. Information points on the habitat map indicate their general location. The habitat is mainly found on sand in association with outcropping rock at this site. Species found in these areas, although not necessarily all together include *E. nigrum* (Crowberry), *J. communis* (Juniper), *Plantago maritima* (Sea plantain), *Carex flacca* (Glaucous sedge), *Succisa pratensis* (Devil's bit-scabious), *Calluna vulgaris* (Ling heather), *Anagallis tenella* (Bog pimpernel), *Primula vulgaris* (Primrose), *Pinguicula vulgaris* (Common butterwort), *Hypnum cumpressiforme*, *Jasione montana* (Sheep's bit), *Armeria maritima* (Thrift) and *Coeloglossum viride* (Frog orchid).

Mobile Dunes (H2120)

The habitat comprises 2ha (approximately 5%) of the total sand dune habitat at Cruit Island (Table 154A). The mobile dunes occur at the back of three of the beaches on Cruit Island. The beach in the southeast at Cruit strand has a band of mobile dune, which begins half way down the beach and continues south to the accreting tip, after which it disappears again. The habitat is absent at the northern end of the beach as there is natural erosion of the foredunes and machair here, compounded by overuse and trampling by visitors. The species present in the habitat include the typical species *Ammophila arenaria* (Marram grass) and *Leymus arenarius* (Lyme grass), which is dominant.

Other species present include *Tussilago farfara* (Colt's-foot), *Festuca rubra* (Red fescue), *Elytrigia juncea* (Sand couch), C*repis capillaris* (Smooth hawk's-beard), *Potentilla anserina* (Silverweed), *Daucus carota* (Wild carrot), *Honckenya peploides* (Sea sandwort) and the negative indicator *Cirsium vulgare* (Spear thistle). Further to the south, other species such as *Agrostis capillaris* (Common bent) and *Elymus caninus* (Bearded couch) were also found in the mobile dunes. This area was also somewhat eroded.

The beach on the western side of Cruit Island has a band of mobile dunes with some *Eryngium maritimum* (Sea holly). There is also some embryonic dunes here and small patches of strandline species.
The beach in the far northwest (beside the golf course car park) has a band of mobile dune, which stretches the length of the beach. At the north of the habitat some sand trapping fences (green plastic) have been erected by the golf course to prevent sand entering the car park. Some of the *A. arenaria* is dying here and as a result one of the monitoring areas failed. Embryonic dunes and some small patches of strandline front the habitat and there are patches of *L. arenarius* present here too. The small beach south of here has a slumped fixed dune edge, however there is some sand accretion and re-colonisation with *A. arenaria*. There are also some patches of strandline to the front.

The typical species found at Cruit include *Ammophila arenaria* (Marram grass), *Leymus arenarius* (Lyme grass) with other species present including *Tussilago farfara* (Colt's-foot), *Peltigera* spp., (*Peltigera* lichen), *Eryngium maritimum* (See holly) as well as some *Elytrigia juncea* (Sand couch) scattered in places.

Some *Senecio jacobaea* (Common ragwort) was found in the habitat on the northwest beach.

Embryonic Dunes (H2110)

The habitat comprises 1.3ha (approximately 2.5%) of the total sand dune habitat at Cruit Island (Table 154A). Embryonic dunes occur on most of the beaches at Cruit Island. They are found in the southern part of the beach at Cruit strand, in front of the machair where they form a substantial part of the accreting tip. Typical species found are *Elytrigia juncea* (Sand couch) as well as *Leymus arenarius* (Lyme grass). Other species more typical of strandline were found intermingled with the above species and include *Cakile maritima* (Sea rocket) and *Atriplex lacinata* (Frosted orache). The beaches on the western side of the island also have bands of the habitat present although in places it is probably affected by people traffic and strong winter storm waves.

Strandline (H1210)

The habitat comprises 0.9ha (approximately 1.8%) of the total sand dune habitat at Cruit Island (Table 154A). Strandline habitat occurs at the back of the beach in the northwest of the site as well as on the two beaches further south. The small beach on the eastern side of Cruit Island, near to Lake Scalpachore has some patches present and the beach to the front of the machair, Cruit strand in the southeast has some patches of strandline intermingled with the embryonic dunes.

Species found include *Honckenya peploides* (Sea sandwort), *Atriplex lacinata* (Frosted orache), *Atriplex prostrata* (Spear-leaved orache), *Tripleurospermum maritimum* (Sea mayweed), *Honckenya peploides* (Sea sandwort) and *Cakile maritima* (Sea rocket). On the small beach on the eastern side there was a mix of strandline species with *Potentilla anserina* (Silverweed) and *Carex arenaria* (Sand sedge).

There were no negative indicators present in the habitat.

IMPACTS

The impacts on the site are listed in Table 154B. The main impacts on the machair habitat include undergrazing (Code 149), driving across (Code 623) and parking on the habitat as well as some walking (Code 622).

The fixed dunes are affected by the presence of the golf course (24.8ha) (Code 601), which has altered their structure and extent in the past. This however is outside the cSAC now but none the less impacts such as runoff of fertilisers (Code 120) and pesticides (Code 110) as well as wind-blown invasive seed species (Code 954) may have an affect on the fixed dune. These impacts are difficult to quantify and therefore appear as ‘unknown’ in Table 154B. The intact fixed dunes are affected by undergrazing (Code 149), some development such as one off housing (Code 403) and holiday villages (Code 409) and there is a road (Code 502) running up the centre of the island.

The dune slack, dunes with *S. repens*, the dunes with *E. nigrum* and the dunes with *J. communis* are all undergrazed (Code 149).

Overuse and trampling (Code 720), natural erosion (Code 900) and walking (Code 622) affect the mobile dunes.

The embryonic dunes and strandline habitats are prone to natural erosion (Code 900) and some damage from walking (Code 622).

Table 154B Intensity and impact of various activities on sand dune habitats at Cruit

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H21A0	149	A	-1	9.6	Inside
H21A0	622	C	0	2	Inside
H21A0	623	B	-1	1	Inside
H2130	110	B	-1	Unknown	Outside
H2130	120	B	-1	Unknown	Outside
H2130	149	A	-1	32	Inside
H2130	403	A	-1	0.4	Inside
H2130	409	A	-1	0.5	Outside
H2130	502	A	-1	Unknown	Inside
H2130	601	A	-1	24.8	Outside
H2130	954	B	-1	Unknown	Inside
H2190	149	A	-1	0.6	Inside
H2170	149	A	-1	1	Inside
H2150	149	A	-1	3.6	Inside
H2140	149	A	-1	0.6	Inside
H2120	622	B	-1	0.5	Inside
H2120	720	B	-1	0.5	Inside
H2120	900	A	0	2	Inside
H2110	622	B	-1	Unknown	Inside
H2110	900	B	0	1.3	Inside
H1210	622	B	-1	Unknown	Inside
H1210	900	B	0	0.9	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 the 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. The main source of baseline information for this site was from the ASI Survey (1989) and the NATURA 2000 report (2001).

Details of the numbers and pass/failure rates of monitoring stops used to assess habitat structure & functions at Cruit are shown in Table 154D.

Machair (H21AO)

There is some loss of extent to the machair habitat to the seaward side as a result of natural erosion compounded by anthropogenic activities. The extent is therefore considered to be *unfavourable-inadequate* at present.

The structure and functions parameter is rated as *unfavourable-bad.* A total of four monitoring stops were placed in the machair habitat. Two passed their targets and two failed (Table 154D). Overall the sward is very tall with rank patches present and as a result species diversity has declined. This is due to the lack of large grazers at the site and it is recommended that some stock be introduced before the habitat declines further.

The future prospects of the machair at Cruit are rated as *unfavourable-inadequate*. This assessment is based on the lack of grazers on the habitat. Parking and driving on the habitat also poses a threat to the ecological stability of the habitat in the future.

An overall EU conservation status of *unfavourable-bad* is assigned to the machair (Table 154C).

The overall Irish conservation status is *unfavourable-declining.*

Fixed Dunes (H2130)

The fixed dunes are quite extensive at this site, however they have been partially taken over by golf course in the north of the site. There are also a number of houses and holiday villages that have been built within the habitat. Both of these activities have led to loss of extent, however as the golf course was founded pre-designation (1997) it is disregarded from this assessment. Some of the houses have been taken out of the cSAC but it seems some are still inside the boundary. There is a small patch of *Hippophae rhamnoides* (Sea buckthorn) in the far southwest of the habitat and if not controlled will further spread in the future. There is also some natural erosion at the front on some of the beaches and may be compounded by anthropogenic activities. The extent of the habitat is therefore rated as *unfavourable-inadequate*.

Table 154C Conservation status of Annex I sand dune habitats at Cruit

Habitat[1]	EU Conservation Status Assessment				
	Favourable	**Unfavourable - Inadequate**	**Unfavourable – Bad**	**Overall EU conservation status assessment**	**Proposed Irish conservation status system[2]**
Machair (H21AO)		Extent Future Prospects	Structure & functions	**Unfavourable - Bad**	Unfavourable - Declining
Fixed Dune (H2130)		Extent Structure & functions Future Prospects		**Unfavourable - Inadequate**	Unfavourable - Declining
Humid Dune Slack (H2190)	Extent	Future Prospects	Structure & functions	**Unfavourable - Bad**	Unfavourable - Declining
Dunes with *Salix repens* (H2170)	Extent Structure & functions	Future Prospects		**Unfavourable - Inadequate**	Unfavourable-Unchanged
Atlantic decalcified fixed dunes (Calluna-Ulicetea) (H2150)	Structure & functions Future Prospects Extent			***Favourable**	Favourable-Declining
Mobile Dunes (H2120)		Extent Future Prospects	Structure & functions	**Unfavourable - Bad**	Destroyed-Partially destroyed
Embryonic Dunes (H2110)	Extent Structure & functions Future Prospects			**Favourable**	Favourable-Maintained
Annual Strandline (H1210)	Structure & functions	Extent Future Prospects		***Unfavourable - Inadequate**	Unfavourable-Unchanged

[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)
*These are trial assessments of the habitat and require further survey work

Table 154D Pass/fail results of Annex I sand dune habitats at Cruit Island

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Machair (H21A0)	2	2	**Unfavourable- Bad**
Fixed Dunes (H2130)	4	2	**Unfavourable- Inadequate**
Humid Dune Slack (H2190)		1	**Unfavourable- Bad**
Dunes with *Salix repens* (H2170)	2	0	**Favourable**
Calluna Heath (H2150)	*1		**Favourable**
Mobile dunes (H2120)	1	1	**Unfavourable- Bad**
Embryonic Dunes (H2110)	5	0	**Favourable**

*Monitoring stop has been passed due to lack of knowledge of the habitat. Note no monitoring stops were carried out in the dunes with E. *nigrum* or strandline habitats.

The structure and functions of the fixed dunes are rated as *unfavourable-inadequate.* A total of six monitoring stops were placed in the fixed dunes. Four passed their targets and two failed (Table 154D). The monitoring stops that failed were as a result of the height of the sward as well as low typical species composition. An introduction of grazers to the site is recommended. The future prospects of the fixed dune at Cruit Island are rated as *unfavourable-inadequate*. This assessment is based on the threat from development within the habitat and the lack of large grazers at the site. The presence of a number of different orchid species within the fixed dune habitat is a feature of local distinctiveness for the site and therefore the habitat should be managed for these important species.

An overall EU conservation status of *unfavourable-inadequate* is assigned to the fixed dune (Table 155C). This is attributable to the three *unfavourable-inadequate* parameters mentioned above.

The overall Irish conservation status is *unfavourable-declining*.

Dune Slack (H2190)

There are two examples of dune slacks at Cruit Island. One is a dry mature slack located in the fixed dunes west of the road. The other is located within the boundary of the golf course and is wet (this is disregarded for this assessment). There is nothing to indicate that there has been a decline in area for the dry mature slack. Therefore the extent of the dune slack is rated as *favourable*. The NATURA 2000 survey gives a ranking of *good representativity* for the habitat for the whole cSAC.

One monitoring stop was placed in the habitat and failed the monitoring criteria. The habitat is declining as a result of undergrazing with a dominance of grasses, bracken and rose (> 5% of monitoring stop). The *S. repens* also accounts for well over 60% of the whole slack (> 40% in monitoring stop) indicating that it will develop into a scrub habitat if left ungrazed. The drainage activities at the golf course are probably also affecting the habitat. Therefore a conservation rating of *unfavourable-bad* is given for structure and functions of the dune slack. The NATURA 2000 survey gives a ranking of *partially degraded structure* for the habitat for the whole cSAC. This is based on other sites mainly, where overgrazing and poaching occur.

The future prospects are rated as *unfavourable-inadequate* for the dune slack.

An overall EU conservation assessment of *unfavourable-bad* is assigned to the dune slack habitat as a result of the poor functioning of the habitat. The overall Irish rating is *unfavourable-declining.*

Dunes with *Salix repens* (H2170)

There is nothing to indicate that there has been a decline in area of the habitat. Therefore the extent of the dunes with *S. repens* is rated as *favourable*.

Two monitoring stop were placed in the habitat and both passed the monitoring criteria. The habitat is undisturbed and is intact with no major impacts. Therefore a conservation rating of *favourable* is given for structure and functions of the dunes with *S. repens.*

The future prospects for the dunes with *S. repens* are rated as *unfavourable-inadequate.* Lack of grazing of the habitat will lead to a decline in condition in the future.

The dunes with *S. repens* are given an overall EU conservation assessment of *unfavourable-inadequate*. The overall Irish rating is *unfavourable-unchanged.*

Atlantic decalcified fixed dunes (Calluna-Ulicetea) (H2150)

The extent of the habitat is rated as *favourable* as the presence of patches of this habitat is an important feature of the site and there is no baseline information to indicate that there has been a decline. It must be noted that this area is probably and overestimate and further survey work should be carried out.

The structure and functions of the habitat are rated as favo*urable.* Although the habitat is under threat as a result of undergrazing this rating is based on one monitoring stop in the north of the island. The stop has been passed on a trial basis although grasses dominate it.

The future prospects are rated as *favourable* for the habitat. However it must be noted that this is a trial conservation assessment and the habitat needs more research especially with regards to grazing at this site.

The overall EU rating is *favourable* while the Irish rating is *favourable-declining*.

Decalcified dunes with *Empetrum nigrum* (H2140)

Decalcified dunes with *E. nigrum* forms a mosaic with a rocky outcrop near the machair. More survey work needs to be carried out and therefore there is no conservation assessment for this habitat at present.

Mobile Dunes (H2120)

The extent of the mobile dunes at the site is considered to be *unfavourable-inadequate*. Severe erosion has occurred at the southwestern beach (Cruit strand), to the front of the machair, as a result of cars being parked in order to access the beach. There is also some natural erosion on other beaches on Cruit Island, which at present

accounts for a loss in extent. The NATURA 2000 assessment for this habitat is *good representativity*, (based on the whole cSAC but mainly refers to Cruit Island).

The mobile dunes located at the beach on the western side of Cruit Island are functioning well, with a high degree of sand accretion and healthy, green *A. arenaria* and *L. arenarius.* However the habitat substantially declines in condition at the beach in the far northwest of the site. Here the *A. arenaria* is dying and fallen over in many places. This may be due to trampling as people access the beach from the golf course car park. Two monitoring stops were placed in the mobile dune in the north of the site and one passed and one failed. Therefore, an assessment of *unfavourable-bad* is given to the mobile dunes, as over 50% of the habitat is in decline.

The future prospects of the habitat are rated as *unfavourable-inadequate*. If less trampling occurs the habitat may recover, but this is uncertain.

The overall EU assessment is rated as *unfavourable-bad* as a result of the decrease in extent and *unfavourable-bad* structure and functions of the habitat. The overall Irish assessment is *destroyed-partially destroyed.* This assessment is as a result of the high levels of anthropogenic activities at the site, particularly at Cruit strand.

Embryonic dunes (H2110)

Embryonic dunes are present in a number of places at this site. Therefore the extent of the habitat is rated as *favourable*.

Five stops were carried out in the habitat and all passed the monitoring criteria. The structure and functions parameter is rated as *favourable* for the habitat. Healthy *E. juncea* and *L. arenarius* was present with plenty of flowering and fruiting and no negative indicators were recorded.

The future prospects for the habitat are considered to be *favourable* at present.

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

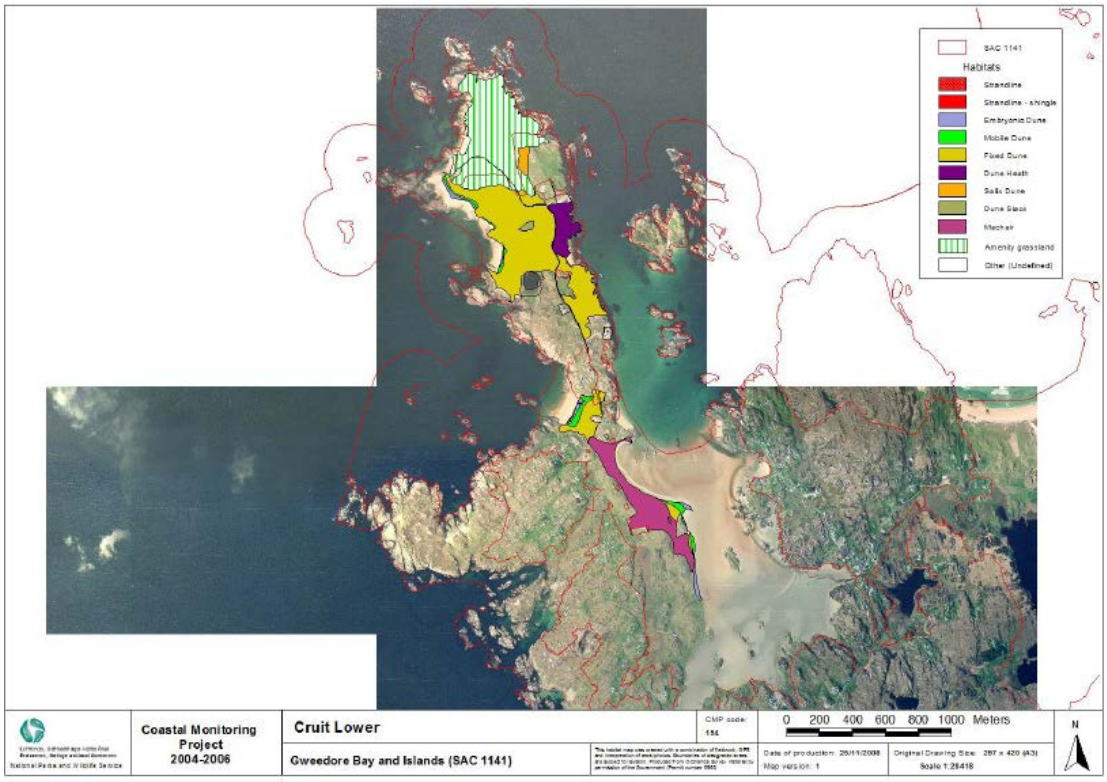
Annual Strandline (H1210)

There is no reference to strandline habitats recorded within the cSAC in the NATURA 2000 form therefore the assessment is based on best scientific judgement of the condition of the habitat. The habitat only occurs in a few small patches at the site and therefore, an overall assessment for extent is given as *unfavourable-inadequate*.

No monitoring stops were carried out in the habitat as individual patches were considered too small, however the list of species for the whole site indicates good diversity and therefore a rating of *favourable* is given for structure and functions of the habitat.

The future prospects for the strandline are rated as *unfavourable-inadequate* for the habitat as a whole at Cruit Island. It is difficult to separate areas for the conservation assessment and therefore it must be noted that some areas may be prone to trampling and overuse.

The overall EU conservation assessment is rated as *unfavourable-inadequate*, while the Irish conservation status is *unfavourable-unchanged*.


SAC 1141
Habitats
Shrubline
Shrubline - shingle
Embryonic Dune
Mobile Dune
Fixed Dune
Dune Heath
Salix Dune
Dune Slack
Machair
Amenity grassland
Other (Undefined)
Coastal Monitoring Project 2004-2006
Cruit Lower
Gweedore Bay and Islands (SAC 1141)
CMP code: 154
0 200 400 600 800 1000 Meters
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:2848
N

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

SITE DETAILS

CMP06 site name: **Carnboy** CMP06 site code: **156** CMP Map No.: **153**

County:**Donegal** Discovery map: **1** Grid Reference: **B 780 230**

6 inch Map No.: **Dg 032 & 041**

Aerial photographs (2000 series): **O 0154 -B, C, D; O 0174-D; O 0175-A, B, C, D; O 0200-A, B.**

NPWS Site Name: **Gweedore Bay and Islands**

NPWS designation: pNHA: **1141** cSAC: **1141**

Ranger Area: **West**

MPSU Plan: **No**

Report Author**: Melinda Swann**

SITE DESCRIPTION

Carnboy is part of the Gweedore and Islands cSAC 1141, which extends from Bloody Foreland to Burtonport in Donegal. The towns nearby include Derrybeg, Bunbeg and Annagary. The other sites dealt with in the current survey are Keadew, Kincaslough, Carnboy, Cruit Island, Gola Island and Lunniagh.

The Annex I sand dune habitats for which the cSAC is designated include 'Machair', 'Humid dune slacks', 'Dunes with *Salix repens'*, 'Atlantic decalcified fixed dunes (Calluno-Ulicetea)', 'Decalcified fixed dunes with *Empetrum nigrum'*, 'Fixed dunes with herbaceous vegetation (Grey dunes)', 'Shifting dunes along the shoreline with *Ammophila arenaria'*, 'Embryonic dunes' and 'Perennial vegetation of stony banks'. The other Annex I habitats for which the cSAC has been designated include '*Juniperus communis* formations on calcareous heaths or grasslands', 'Alpine and sub-alpine heaths', 'Dry heaths', 'Oligothrophic lakes containing very few minerals of sandy plains (Littorelletalia-Uniflorae)', 'Mediterranean salt meadows', 'Atlantic salt meadows', 'Reefs and Lagoons'.

The Annex II plant species *Najas flexilis* (Kincashlough), *Drepanocladus vernicosus* and *Petalophyllum ralfsii* (Keadew & Derrybeg) as well as the Red Data Book

species, *Draba incana* (Hoary whitlow-grass), *Pseudorchis albida* (Small white orchid) and *Lathyrus japonicus* (Sea pea) have all been recorded within the cSAC.

Annex I bird species found include *Pyrrhocorax pyrrhocorax* (Chough) (up to 40 individuals may be seen in the winter (BirdWatch Ireland pers comm., 2007)), *Branta leucopsis* (Barnacle goose), *Pluvialis apicaria* (Golden plover), *Crex crex* (Corncrake), *Falco Peregrinus* (Peregrine falcon) as well as *Sterna hirundo* (Common tern) and *Sterna paradisea* (Arctic tern). Mammals found within the cSAC include *Halichoerus grypus* (Grey seal), *Meles meles* (Badger), *Lepus timidus hibernicus* (Irish Mountain hare), *Mustela erminea* (Stoat) and the Annex II species *Lutra lutra* (Otter). One amphibians found is *Rana temporaria* (Common frog). Sand martins (*Riparia riparia*) and *Saxicola torquata* (Stonechat) were recorded at Carnboy on the survey day.

Carnboy is a large site, which is found north of Kincaslough and south of Derrybeg and stretches from Inishfree Bay to Gweedore Bay. It is a sandy spit or tombolo, which connects an island to the mainland. A large area of the sandy spit is now developed for Donegal Airport and is outside the boundary of the cSAC. There is a long sandy beach on the eastern side of the spit (Inishfree Bay), which has Blue Flag status and smaller beaches (Illannamarve, Tranamaud and Trasruhannanaskin) north of this. On the western side of the spit there is a saltmarsh that grades into sand flats known as Braade strand. To the very north there is a large beach (Dunmore strand) and extensive sand flats. The area is a popular tourist destination and the presence of the airport makes it very busy in the summer months.

The current survey concentrates on Annex I sand dune habitats found at Carnboy and includes fixed dunes, humid dune slacks, mobile dunes, embryonic dunes and strandline. The areas of Annex I sand dune habitats recorded at Carnboy are shown in Table 156A.

Table 156A Areas of EU Annex I habitats mapped at Carnboy

EU Code	EU Habitat	Area (ha)
H2130	Fixed Dunes	61.3
H2190	Humid Dune Slacks	0.4
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	2.4
H2110	Embryonic Dunes	1.4
H1210	Annual Strandline	0.14
	Total Sand dune excluding developments/modifications*	**65.6**
	Sandy substrate area including developments/modifications	**85.1**

*Developments in this case include airport (20.9ha), houses (0.52ha), a track (1.5ha) and a car park (0.1ha).

Fixed Dunes (H2130)

The priority habitat fixed dune comprises 61.3ha (approximately 93.4%) of the total sand dune habitat at Carnboy (Table 156A). The fixed dunes are located in two distinct parts of this site. The first area is located west of Donegal Airport behind Inishfree Bay and extends northwards to Illannamarve Strand. Another area of fixed dunes is located at the very north of the site behind Dunmore Strand. There is also a small area of the habitat located behind the beach marked Trasruhannanaskin. The habitat east of the airport is composed of undulating *Ammophila arenaria* (Marram grass) - dominated semi-fixed dunes which grade into fixed habitat landward. The fixed dune hummocks are also, mainly dominated by *A. arenaria* and overall this area is undergrazed with a dense closed cover of grasses. There is some short sward interspersed in places, with typical species present. However, there is low bryophyte cover in general. There are many sandy paths through the habitat leading to the beach and vehicles entering the habitat along the fence line of the airport have created a track. This track leads to a popular parking place behind Illannamarve Strand and there were a number of caravans and tents situated here also. Natural erosion of the fixed dunes at the most southerly end of the beach at Inishfree Bay had occurred and there were also areas of eroded dune face along the beach with a build up mobile dunes to the front.

There were cattle present in the area of fixed dunes east of Illannamarve Strand. As a result some areas had a more open, species diverse sward with less *A. arenaria*. However, in the places where cattle were absent the sward was rank with *A. arenaria* dominating. There is a large natural blowout, which is poached by cattle in the fixed dunes near to Illannamarve Strand, however it is now re-vegetating. A dune slack is located nearby. Some *Salix repens* (Creeping willow) was noted on the hill near here

but was deemed too small to map as the habitat 'Dunes with *Salix repens'*, however this may need further field survey to establish the true extent.

The fixed dunes behind Trasruhannanaskin are species-rich and are grazed by a few cattle in the winter.

The fixed dunes at Dunmore Strand to the north are mostly undisturbed except by walkers accessing the beach and there is also a car park nearby. There are no large grazers here and so the sward is mostly rank with an abundance of *A. arenaria* and as a result, in places there is low species diversity. Bracken is abundant in this part of the site and there is some natural erosion of the fixed dunes to the front of the beach. A small dump, which had been burnt, was also noted amongst the fixed dunes in this part of the site. The lack of grazers, recreation and the presence of the airport are all having an adverse affect on the fixed dune habitat.

The typical species found in the fixed dune include *Euphrasia officinalis* agg. (Eyebright), *Galium verum* (Lady's bedstraw), *Viola* spp. (Pansy), *Plantago lanceolata* (Ribwort plantain), *Carex arenaria* (Sand sedge), *Trifolium repens* (White clover), *Festuca rubra* (Red fescue), *Anthyllis vulneraria* (Kidney vetch), *Lotus corniculatus* (Common bird's-foot trefoil), *Polygala vulgaris* (Common milkwort), *Hypochaeris radicata* (Cat's ear), *Crepis capillaris* (Smooth hawk's beard), *Cerastium fontanum* (Common mouse-ear), *Linum catharticum* (Fairy flax), *Prunella vulgaris* (Selfheal), *Peltigera* spp. (*Peltigera* lichen), *Luzula campestris* (Field wood-rush), *Rhinanthus minor* (Yellow-rattle), *Veronica chamaedrys* (Germander speedwell), *Thymus polytrichus* (Wild thyme), *Sedum acre* (Biting stonecrop), *Centaurium erythraea* (Common centaury), *Carex flacca* (Glaucous sedge), *Pilosella officinarum* (Mouse-ear-hawkweed) and *Campanula rotundifolia* (Harebell).

3

Other species recorded in the fixed dune include *Ranunculus repens* (Creeping buttercup), *Ammophila arenaria* (Marram), *Centaurea nigra* (Common Knapweed), *Daucus carota* (Wild carrot), *Holcus lanatus* (Yorkshire-fog), *Phleum arenarium* (Sand cat's-tail), *Tussilago farfara* (Colt's-foot), *Angelica sylvestris* (Wild angelica), *Trifolium pratense* (Red clover), *Taraxacum agg.* (Dandelion), *Rumex acetosella* (Sheep's sorrel), *Potentilla anserina* (Silverweed), *Leontodon autumnalis* (Autumn

hawkbit), *Heracleum sphondylium* (Hogweed), *Achillea millefolium* (Yarrow), *Bellis perennis* (Daisy), *Agrostis stolonifera* (Creeping bent), *Dactylis glomerata* (Cock's-foot), *Anacamptis pyramidalis* (Pyramidal orchid) and *Dactylorhiza* spp. (Marsh-orchid spp.). In the fixed dunes in the north near to Dunmore Strand the following species were also found: *Leymus arenarius* (Lyme grass), *Rosa pimpinellifolia* (Burnet rose), *Silene uniflora* (Sea campion), *Jasione montana* (Sheep's-bit), *Succisa pratensis* (Devil's-bit scabious), *Primula vulgaris* (Primrose), *Plantago maritima* (Sea plantain) and the orchids *Gymnadenia conopsea* (Fragrant orchid) and *Coeloglossum viride* (Frog orchid).

4

Typical mosses recorded in the fixed dune include *Rhytidiadelphus squarrosus Rhytidiadelphus triquetrus, Hypnum cupressiforme, Hypnum jutlandicum* and *Tortula ruraliformis.* Other mosses recorded in the habitat include *Scleropodium purum, Calliergonella cuspidata, Homalothecium lutescens,* and *Plagiomnium undulatum.*

The negative indicator *Senecio jacobaea* (Common ragwort) was found throughout the habitat but was not abundant. *Cirsium arvense* (Creeping thistle) was noted and *Pteridium aquilinum* (Bracken) was abundant in the fixed dunes at Dunmore Strand. *Holcus lanatus* (Yorkshire-fog) was negative in one monitoring area here also as it accounted for 30% cover and a small amount of *Rubus fruticosus* (Bramble) was also noted.

Humid Dune Slacks (H2190)

The dune slack habitat comprises 0.4ha (approximately 0.6%) of the total sand dune habitat at Carnboy (Table 156A). One dune slack was found in the fixed dunes north of the strand at Inishfree Bay. The dune slack is wet with typical species present and is functioning and intact. Cattle lightly graze the slack and some poaching was recorded, although this is expected in such a wet habitat.

The typical species found include *Carex flacca* (Glaucous sedge), *Carex nigra* (Common sedge), *Hydrocotyle vulgaris* (Marsh pennywort), *Salix repens* (Creeping willow) (5% cover), *Prunella vulgaris* (Selfheal) and the typical moss *Calliergonella cuspidata*.

Other species recorded include *Anagallis tenella* (Bog pimpernel), *Ranunculus repens* (Creeping buttercup) and the grasses *Agrostis stolonifera* (Creeping bent) and *Cynosurus cristatus* (Crested dog's-tail), which account for 40% of the habitat.

The typical species of fixed dune also found in the dune slack, but outside the monitoring stop. These include *Euphrasia officinalis* agg. (Eyebright), *Galium verum* (Lady's bedstraw), *Plantago lanceolata* (Ribwort plantain), *Trifolium repens* (White clover), *Festuca rubra* (Red fescue), *Anthyllis vulneraria* (Kidney vetch), *Lotus corniculatus* (Common Bird's-foot trefoil), *Polygala vulgaris* (Common milkwort), *Hypochaeris radicata* (Cat's ear), *Cerastium fontanum* (Common mouse-ear), *Linum catharticum* (Fairy flax), *Rhinanthus minor* (Yellow-rattle), *Thymus polytrichus* (Wild thyme), *Sedum acre* (Biting stonecrop) and *Campanula rotundifolia* (Harebell).

Other species recorded in the slack, but outside the monitoring stop include *Bellis perennis* (Daisy), *Dactylorhiza* spp. (Marsh-orchid spp.), *Rosa pimpinellifolia* (Burnet rose), *Ammophila arenaria* (Marram), *Anacamptis pyramidalis* (Pyramidal orchid), *Heracleum sphondylium* (Hogweed), *Daucus carota* (Wild carrot), *Holcus lanatus* (Yorkshire-fog), *Armeria maritima* (Thrift), *Poa* spp. (Meadow-grass), *Parnassia palustris* (Grass-of-parnassus), *Arenaria serpyllifolia* (Thyme-leaved sandwort) and *Primula vulgaris* (Primrose) and the mosses *Rhytidiadelphus squarrosus Scleropodium purum*, *Homalothecium lutescens* and *Hypnum jutlandicum.*

The negative indicator *Senecio jacobaea* (Common ragwort) was recorded in the habitat.

Mobile Dunes (H2120)

The mobile dune habitat comprises 2.4ha (approximately 3.6%) of the total sand dune habitat at Carnboy (Table 156A). The mobile dunes have been previously eroded at Carnboy in the past, but at present are mostly re-building. They are re-forming along the beach at Inishfree Bay in particular and in places are fronted by embryonic dunes. However there are some stretches that are still lacking the habitat and an eroded fixed dune face is present. In the intact mobile habitat there is plenty of healthy growth of the typical species *Ammophila arenaria* (Marram grass), which dominates with some *Leymus arenarius* (Lyme grass) on the strand at Inishfree Bay.

The habitat is patchy at Illannamarve Strand and where it has been eroded back to the fixed dunes, sand martins have nested in the bare sand. There is a small bay north of this strand (Trasruhannanaskin), which has a narrow band of intact embryonic and mobile dunes grading into fixed dunes landward.

The habitat is again discontinuous on the beach at Dunmore Strand, but where there is intact habitat there is healthy growth of *Leymus arenarius* (Lyme grass), which dominates. Embryonic dunes mixed with strandline vegetation are found to the front of the habitat.

Other species found in the mobile dunes at Carnboy include *Eryngium maritimum* (Sea-Holly), *Tussilago farfara* (Colt's-foot), *Elytrigia juncea* (Sand couch), *Atriplex* spp. (Orache spp.), *Daucus carota* (Wild carrot), *Festuca rubra* (Red fescue), *Honckenya peploides* (Sea sandwort) and *Taraxacum agg.* (Dandelion).

Some *Senecio jacobaea* (Common ragwort) and locally abundant patches of *Cirsium* spp. (Thistle spp.) were recorded in the habitat.

Embryonic Dunes (H2110)

The embryonic dunes habitat comprises 1.4ha (approximately 2.1%) of the total sand dune habitat at Carnboy (Table 156A). Narrow bands of the habitat are re-building in places along the beach at Inishfree Bay. There are small patches of the habitat at Illannamarve Strand and the small beach north of this (Trasruhannanaskin) has a narrow band of embryonic dunes. There are also examples of the habitat found on Dunmore Strand to the north but here the habitat is discontinuous.

The typical species found are *Leymus arenarius* (Lyme grass) and *Elytrigia juncea* (Sand couch), which are dominant. Some *Eryngium maritimum* (Sea-Holly) was also noted in one area.

There were no negative indicators recorded in the habitat.

Strandline (H1220)

The strandline habitat comprises 0.14ha (approximately 0.2%) of the total sand dune habitat at Carnboy (Table 156A). The habitat is not very extensive at Carnboy probably due to the high recreational pressure at the site and the fact that Inishfree Bay is a Blue Flag beach. Any cleaning of the beach will have an adverse affect on the habitat as the substrate (seaweeds) and seed base needed for growth are removed. There were some patches noted on Illannamarve Strand and the small, sheltered beach north of Illannamarve Strand (Trasruhannanaskin) as well as at Dunmore Strand, where it is intermingled with embryonic dunes.

The typical species recorded in the habitat include *Atriplex prostrata* (Spear-leaved orache), *Atriplex laciniata* (Frosted orache), *Atriplex* spp. (Orache spp.), *Honckenya peploides* (Sea sandwort) and *Tripleurospermum maritimum* (Sea mayweed).

Other species found in the habitat include *Elytrigia juncea* (Sand couch), *Leymus arenarius* (Lyme grass) *Ammophila arenaria* (Marram grass), *Beta vulgaris* ssp. *maritima* (Sea beet) *Rumex crispus* (Curled dock) and *Agrostis stolonifera* (Creeping bent).

No negative indicators were found in any of the patches of strandline at Carnboy.

IMPACTS

The main activities impacting the sand dune habitats at Carnboy are given in Table 156B. The most obvious impact on the habitats is the presence of Donegal Airport (Code 505), which was built on the sandy spit over what was once machair. This is fenced off (Code 150) from the surrounding land and is excluded from the cSAC. It most probably causes air pollution (Code 702) and noise nuisance (Code 710) in the surrounding area (all the above impacts appear under 21BB in Table 156B).

The fixed dunes are mainly ungrazed (Code 149) in the south of the site and in the far north at Dunmore strand, which is a negative impact on the species diversity of the habitat. However, the fixed dunes just north of the airport are grazed by cattle (Code 140), mainly in the winter months. The dunes beside the airport are affected by

driving of motorised vehicles (Code 623), which has caused an eroded track (Code 501) along the fence-line of the airport. There is a tarmacadam car park (Code 400), at the southern end of this track, which provides ample space for parking. A height restriction barrier, to prevent vehicle access and further erosion could be installed to block this track. There was some burning (Code 180) of the *A. arenaria* (Marram grass), in one area of the fixed dune west of the track, however it was only a small patch. On the eastern side of the airport there is a road (Code 502), which fragments the habitats. There were a number of caravans and tents (Code 608) on the flat fixed dune grassland west of Carnboy Lough and some trampling and overuse (Code 720) was noted here as well as a high number of cars parked in the habitat. In the northern part of the site near Dunmore strand there were high numbers of walkers (Code 622). However, as there is no grazing here, walking is a positive influence on the fixed dunes as the sward is more open in appearance in these areas. There are a number of new houses (Code 403), which have been built in the fixed dunes and are within the cSAC. Natural erosion (Code 900) of the habitat has occurred in places and there is a large blowout north west of the airport.

Cattle lightly graze the dune slack (Code 140) and some walking (Code 622) may occur through the habitat.

The mobile dune is affected by natural erosion (Code 900) in places. The habitat is also prone to trampling and overuse (Code 720) by visitors accessing the beaches.

The embryonic dunes and strandline are prone to natural erosion (Code 900), compounded by anthropogenic activities, such as trampling and overuse (Code 720). Walking (Code 622) also affects the mobile dunes, embryonic dunes and the strandline habitats.

Table 156B Intensity and impact of various activities on sand dune habitats at Carnboy

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H2130	140	C	+2	2.6	Inside
H2130	149	A	-1	59	Inside
H2130	180	C	-1	Unknown	Inside
H2130	400	A	-1	0.1	Inside
H2130	403	A	-1	0.52	Inside
H2130	501	A	-1	1.5	Inside
H2130	502	A	-1	Unknown	Inside
H2130	608	B	-1	0.72	Inside
H2130	622	C	+2	15	Inside
H2130	623	A	-1	3	Inside
H2130	720	C	-1	3	Inside
H2130	900	B	0	Unknown	Inside
H2190	140	C	+2	0.4	Inside
H2190	622	C	0	0.1	Inside
H2120	622	B	-1	1	Inside
H2120	720	B	-1	1	Inside
H2120	900	A	0	1.8	Inside
H2110	622	B	-1	0.1	Inside
H2110	720	B	-1	0.2	Inside
H2110	900	B	0	Unknown	Inside
H1210	622	B	-1	0.1	Inside
H1210	720	B	-1	0.1	Inside
H1210	900	B	0	Unknown	Inside
21BB	150	A	-1	Unknown	Outside
21BB	505	A	-2	20.9	Outside
21BB	702	B	-1	Unknown	Outside
21BB	710	B	-1	Unknown	Outside

[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 156C). The main source of baseline information for this site was from the ASI Survey (1989) and the NATURA 2000 report (2001).

Table 156C Conservation status of Annex I sand dune habitats at Carnboy

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 Structure & functions Future Prospects		**Unfavourable - Inadequate**	Unfavourable - Declining
Humid Dune Slack (H2190)	Extent Structure & functions Future Prospects			**Favourable**	Favourable-Maintained
Mobile Dunes (H2120)	Future Prospects	Extent *Structure & functions		**Unfavourable - Inadequate**	Unfavourable - Recovering
Embryonic Dunes (H2110)	Extent Structure & functions Future Prospects			**Favourable**	Favourable - Maintained
Annual Strandline (H1210)	Structure & functions	Extent Future Prospects		**Unfavourable - Inadequate**	Unfavourable - Unchanged

[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)
*Although all monitoring stops passed the overall structure of some of the mobile dunes were inadequate

Details of the numbers and pass/failure rates of monitoring stops used to assess habitat structure & functions at Carnboy are shown in Table 156D.

Table 156D Pass/fail results of Annex I sand dune habitats at Carnboy

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Fixed Dunes (H2130)	11	1	**Unfavourable-inadequate**
Humid Dune Slack	1		**Favourable**
Mobile dunes	5	0	***Unfavourable-inadequate**
Embryonic dunes	6	0	**Favourable**
Annual Strandline	5	0	**Favourable**

*Although the monitoring stops pass, the structure of mobile dunes is considered inadequate, based on best scientific judgement.

Fixed Dunes (H2130)

The fixed dunes are quite extensive at Carnboy, however they have been altered in some areas. There is a car park in the south of the habitat and an eroded track has been caused by vehicles driving along the fence, to park in the fixed dunes. Further

north some caravans have been placed on the habitat and therefore the extent of the habitat is rated as *unfavourable-inadequate*. The NATURA 2000 survey gives a ranking of *excellent representativity* for the habitat for the whole cSAC.

The structure and functions parameter is rated as *unfavourable-inadequate.* A total of twelve monitoring stops were placed in the fixed dunes. Eleven passed their targets and one failed (Table 156D). The monitoring stop failed as a result of sward height greater than 5-20cm and low typical species composition. The fixed dunes are undergrazed in places and if this continues the overall species diversity will be compromised. The NATURA 2000 survey gives a ranking of *structure well conserved* for the habitat for the whole cSAC.

The future prospects of the fixed dune at Carnboy are rated as *unfavourable-inadequate*. This assessment is based on the fact that the dunes may become rank unless an appropriate grazing regime is implemented. The airport may expand and the continuing threat of erosion of the surface of the grassland as a result of motorised vehicles entering the habitat. The area is popular for camping and caravans and this needs to be monitored. Orchid species are quite common throughout the habitat and are a feature of local distinctiveness for the site and therefore the habitat should be managed accordingly. The NATURA 2000 survey gives a ranking of *good prospects* for the habitat for the whole cSAC.

An overall EU conservation status of *unfavourable-inadequate* is assigned to the fixed dune (Table 156C). This is attributable to the *unfavourable-inadequate* extent and structure and functions and future prospects of the habitat at this site.

The overall Irish conservation status is *unfavourable-declining*.

Humid Dune Slack (H2190)

There is no evidence to suggest that there has been a change or loss of extent of the habitat and therefore the extent is rated as *favourable*. The NATURA 2000 survey gives a ranking of *good representativity* for the habitat for the whole cSAC.

The Structure and functions of the habitat are also rated as *favourable* as the monitoring stop placed in the habitat passed all the necessary criteria. The NATURA 2000 survey gives a ranking of *partially degraded structure* for the habitat for the whole cSAC. This is based on other sites mainly, where overgrazing and poaching occur.

The dune slack habitat is mostly undisturbed at Carnboy and is lightly grazed, although some poaching was evident. This should be monitored closely but at present the future prospects are rated as *favourable.* The NATURA 2000 survey gives a ranking of *average or unfavourable prospects* for the habitat for the whole cSAC.

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

Mobile Dunes (H2120)

Although re-growth of the mobile dunes is evident there are still many areas along the beach that lack mobile dunes and therefore the extent of the mobile dunes at Carnboy is considered to be *unfavourable-inadequate*. The NATURA 2000 assessment for this habitat is *good representativity*, although this is based on the whole cSAC and mainly refers to Cruit Island.

Five monitoring stops were carried out in the mobile dunes and all passed the monitoring criteria. The stops had plenty of healthy *A. arenaria* and some *Leymus arenarius* was also found. There was good flowering and fruiting of the grasses and no negative indicators were recorded. However as there has been erosion and there is slumped vegetation evident in some places the structure of the habitat is not fully intact. The structure and functions of the habitat are therefore rated as *unfavourable-inadequate*. The NATURA 2000 assessment for this habitat is *structure well conserved,* but this again is based on the whole cSAC.

The overall site is a busy holiday destination and trampling and walking on the habitat will have an affect on the growth of the habitat in the future. However in many places that were previously eroded signs of sand accretion and re-growth of the habitat are evident. The future prospects of the habitat are therefore rated as *favourable.* The

NATURA 2000 assessment for this habitat is good prospects for the cSAC as a whole.

The overall EU assessment is rated as *unfavourable-inadequate.*

The overall Irish assessment is *unfavourable -recovering.*

Embryonic dunes (H2110)

Embryonic dunes have developed in a number of areas at Carnboy and in most cases are intact, therefore the extent of the habitat is rated as *favourable*. The NATURA 2000 survey gives a ranking of *excellent representativity* for the embryonic dunes within the whole cSAC.

A total of six monitoring stops were placed in the habitat and all passed. There was good flowering and fruiting of the typical species *Elytrigia juncea* (Sand couch) and *Leymus arenarius* (Lyme grass) and they were also very healthy with plenty of green growth. There were no negative indicators found in the habitat and therefore the structure and functions of the habitat are rated as *favourable.* The NATURA 2000 assessment for this habitat is rated as *structure well conserved*.

The future prospects are rated as *favourable* for the site as there is accretion occurring in front of the mobile dunes with further growth of embryonic dunes possible. The NATURA 2000 assessment for this habitat is *good prospects.*

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

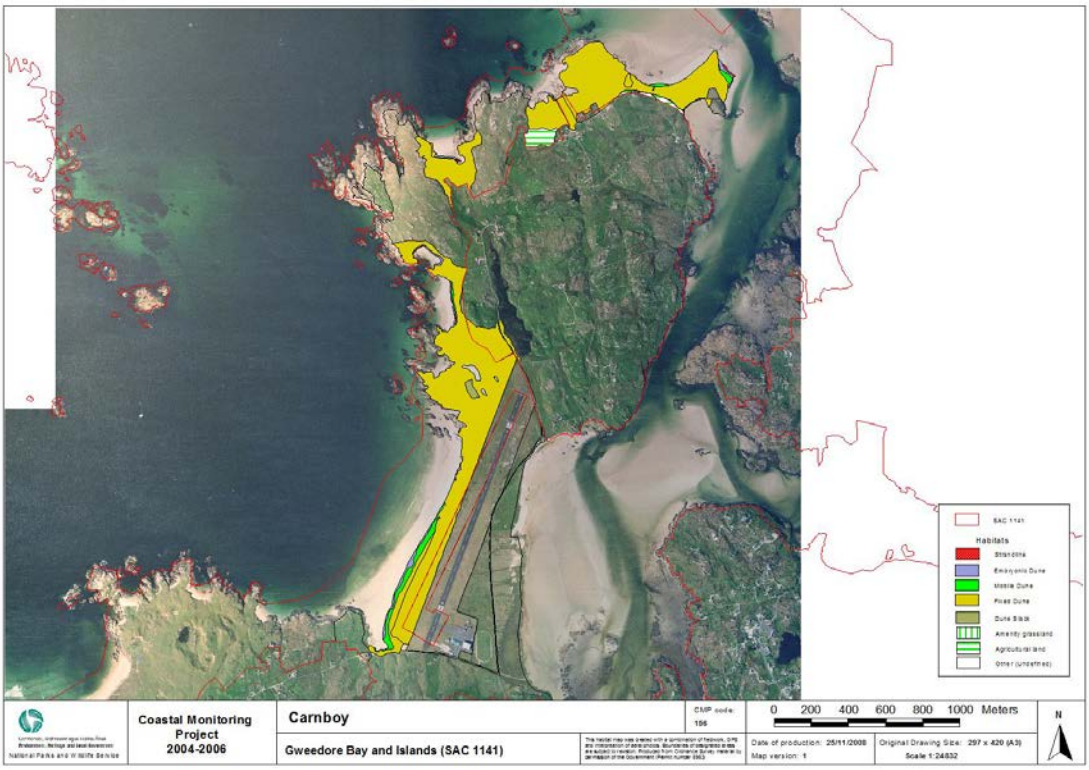
Annual Strandline (H1210)

There is no reference to strandline habitats recorded within the cSAC in the NATURA 2000 report. The habitat occurs at Carnboy in a number of places along the beaches. However the patches are relatively small and as the site is heavily trampled some areas may be prevented from expanding in size. An assessment for extent is given as *unfavourable-inadequate*.

Five monitoring stops were carried out in the habitat. The monitoring stops passed all the criteria set out in the monitoring process and therefore structure and functions of the habitat are rated as *favourable*.

The beaches are popular in the summer months for holidaymakers and walking is popular at the site. Some of the beaches are more heavily trampled than others and so the habitat may not have a chance to build up. Furthermore Inishfree Bay is a Blue Flag beach, which indicates the possibility of mechanical cleaning and therefore removal of the seaweeds and seed base essential to the habitat. Therefore the future prospects for the strandline are rated as *unfavourable-inadequate*.

The overall EU conservation assessment is rated as *unfavourable-inadequate*, while the Irish conservation status is *unfavourable-unchanged*.


SAC 1141
Habitats
Strandline
Embryonic Dune
Mobile Dune
Fixed Dune
Dune Slack
Amenity grassland
Agricultural land
Other (unspecified)
Coastal Monitoring Project 2004-2006
Carnboy
Gweedore Bay and Islands (SAC 1141)
CMP code: 196
0 200 400 600 800 1000 Meters
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:24832
N

Appendix VII – Gola Island site report and habitat map from the CMP (Ryle *et al*., 2009)

SITE DETAILS

CMP06 site name: **Gola Island** CMP06 site code: **158** CMP Map No.: **155**

County: **Donegal** Discovery map: 1 Grid Reference: **B770 270**

6 inch Map No.: **Dg 032**

Aerial photographs (2000 series): **O 0154-A, O 0153-B, O 0133-C**

NPWS Site Name: **Gweedore Bay and Islands**

NPWS designation: pNHA: **1141** cSAC: **1141**

Ranger Area**: Donegal**

MPSU Plan**: No**

Blue Flag **No**

Report Author**: Melinda Swann**

SITE DESCRIPTION

Gola Island is part of the larger cSAC Gweedore Bay and Islands and is located in the mouth of the Gweedore estuary in County Donegal. The whole cSAC is an extensive coastal site situated between Bloody Foreland in the north and Burtonport in the south, and near the towns of Derrybeg, Bunbeg and Annagary. It includes a large stretch of coastline, many islands, including Inishsirrer, Inishmeane, Gola, Umfin, Inishfree Lower, Cruit and Owey. Areas of machair grassland and sand dunes occur in several places along the coast and large areas of sandflats are exposed off the coast at low tide.

Gola Island itself is designated, as it has the Annex I habitat 'Fixed coastal dunes with herbaceous vegetation'. This habitat is located on a sandy spit on the southeast side of the island. The spit also has the Annex I habitats 'Shifting dunes along the shoreline with *Ammophila arenaria'* and a small area of 'Perennial Vegetation of Stony Banks'.

The island is mostly uninhabited except during the summer months. A few families have returned and renovated houses, which they use as holiday homes. Sheep graze the island and have access to the sand spit. The fact that there are very few people

visiting the island makes it a relatively undisturbed site. This means that the habitats are intact and they in turn offer good nesting sites for sea birds, waders and wintering waterfowl.

According to the Natura 2000 report for the site, Gola is a good open grassy, maritime habitat for in particular, *Vanellus vanellus* (Lapwing) and *Haematopus ostralagus* (Oystercatcher). Many other species use the island for breeding such as *Sterna hirundo* (Common Tern) (Annex I species), *Sterna paradisaea* (Arctic Tern) (Annex I) and *Uria aalge* (Guillemot). Furthermore, other Annex I species such as *Branta leucopsis* (Barnacle Geese) and *Phyrrhocorax phyrrhocorax* (Choughs) use the island for feeding and breeding. The rare *Crex crex* (Corncrake), also an Annex I bird species is present on the island. According to local information there may be up to two Corncrakes that use the area and can be heard calling for weeks at a time during the summer months. One corncrake was noted during the current survey (CMP, 2006) amongst the fixed dunes on the sand spit. Oystercatchers were also seen nesting on the rocks near the spit. Finally the island is also an important nesting site for the Annex I species *Hydrobates pelagicus* (Storm petrel).

The presence of the Annex I habitats as well as several populations of Annex I EU Birds Directive species, adds to the conservation value of the site.

Table 158A Areas of EU Annex I habitats mapped at Gola Island

EU Code	EU Habitat	Area (ha)
H2130	Fixed coastal dunes with herbaceous vegetation	3.377 ha
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	0.541 ha
H1220	Perennial Vegetation of Stony Banks	0.022 ha
	Total Sand dune	3.940 ha

Fixed Dunes (H2130)

The priority habitat fixed dune comprises 3.377 ha (approximately 86%) of the total sand dune habitat at Gola Island (Table158A). The habitat constitutes only a small area of the whole island and is restricted to a sandy spit in the southeast. The spit is less than 4 hectares in size with a relatively flat appearance. The fixed dunes increase in height towards the landward side with a few medium-sized (5-10m high) dunes found here. The fixed dune grades into mesotrophic grassland on the main island. The fixed dune is composed of *Ammophila arenaria* (Marram grass) hummocks

interspersed with a shorter, herb sward. There is sheep grazing on the spit but as there is so much *Ammophila arenaria* (Marram grass) present the sheep seem to prefer to graze in the grassland to the west. The habitat therefore, is showing signs of being undergrazed and in future will lose species diversity.

Typical plant species occurring on the fixed dune at Gola include *Lotus corniculatus* (Common bird's-foot trefoil), *Galium Verum* (Lady's bedstraw), *Trifolium repens* (White clover), *Festuca rubra* (Red fescue), *Hypochaeris radicata* (Cat's-ear), *Campanula rotundifolia* (Harebell), *Crepis capillaris* (Smooth hawk's-beard), *Viola* spp. (Violet) and *Cerastium fontanum* (Common mouse-ear). The typical moss found is *Rhytidiadelphus squarrosus.*

Other fixed dune species found are *Ammophila arenaria* (Marram grass), *Taraxacum* agg., (Dandelion), *Viola canina* (Heath dog-violet), *Ranunculus repens* (Creeping buttercup), *Poa* spp. (Meadow grass spp.), *Succisa pratensis* (Devil's-Bit scabious), Briza media (Quaking grass), Tussilago farfara (Colt's foot) and *Utricularia australis* (Bladderwort).

Other mosses found include *Calliergonella cuspidata*, *Homalothecium* spp., *Rhytidiadelphus loreus* and *Plagiomnium* spp.

Negative indicators including *Senecio jacobaea* (Common ragwort), *Cirsium arvense* (Creeping thistle) and *Urtica diocia* (Common nettle) occur throughout the habitat.
There is a structure on the fixed dune at the top of the spit, which is most probably a light beacon.

Mobile Dunes (H2120)

The mobile dune habitat comprises 0.541 ha (approximately 13%) of the total sand dune habitat at Gola Island (Table158A). The main band of mobile dunes is located along the southern side of the spit as well as around the top of the spit. There is some mobile dune located on the northern side, but this is a steeper, narrow band.

The typical species *Ammophila arenaria* (Marram grass) dominates the intact mobile dune habitat. Other species found include *Lotus corniculatus* (Common bird's-Foot

trefoil) and *Galium verum* (Lady's bedstraw). There is young, healthy *Ammophila arenaria* (Marram grass), especially at the seaward edge of the habitat.

Perennial Vegetation of Stony Banks H1220

The perennial vegetation habitat covers only a small area of the northern side of the spit (0.022 ha) (approximately 0.6% of the total sand dune habitat) (Table 158A). Here there is a mainly un-vegetated cobble, storm beach. At the back of this there is some vegetated cobble, which can be classed as pioneer Perennial Vegetation of Stony Banks.

The typical species found in the habitat is *Honckenya peploides* (Sea sandwort) with small patches of *Ammophila arenaria* (Marram grass). No other species were noted.

IMPACTS

The main activities impacting the sand dunes at Gola Island are given in Table 158B. The fixed dune area is grazed (Code 140) by sheep. The monitoring process showed that the sward is, at present taller than the target height of twenty centimeters. The area therefore, can also be classed as being undergrazed (Code 149). There is an abundance of agricultural weeds (Code 954) present throughout the fixed dune such as *Cirsium arvense* (Creeping thistle) and *Urtica dioica* (Common nettle). This indicates that there may have been some disturbance in the past due to a more intense grazing regime, or there may have been some agricultural improvement. There is a high abundance of *Cirsium arvense* (Creeping thistle) towards the back of the fixed dune and continuing into mesotrophic grassland. This grassland was agriculturally improved in the past and the weeds may be spreading from here into the fixed dune. There is a small blowout towards the land ward side of the fixed dune. This may be natural erosion (Code 900) compounded by trampling by sheep (Code 720).

There are little or no recreational impacts on the fixed dune as, only a few people visit the island during the summer months. However, there is a beacon situated at the top of the spit and there is a track leading up to this, with some sand exposed. This is as a result of walking (Code 622) to the beacon to carry out maintenance work.

The mobile dune is naturally eroded (Code 900) back to the fixed dune in some patches on the northern side of the spit. This is the more exposed side and it would be expected that the habitat would be more, patchy in distribution.

The perennial vegetation of stony banks is prone to natural erosion (Code 900) especially during winter storms however it is relatively intact. No other obvious impacts are apparent.

Table 158B Intensity and impact of various activities on sand dune habitats at Gola Island

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha[5]	Location of Activity[5]
H2130	140	B	0	3.377	Inside
H2130	149	C	-1	3	Inside
H2130	622	C	-1	0.01	Inside
H2130	720	C	-1	0.01	Inside
H2130	900	C	-1	0.1	Inside
H2130	954	B	-1	0.5	Inside
H2120	900	A	0	0.25	Inside
H1220	900	C	0	0.022	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

CONSERVATION STATUS

The conservation status of a site is based on extent, structure & functions and future prospects. This is based on the condition of the site at the time of survey but where possible baseline information is also consulted. It must be noted that in certain cases this information may be superceded by the current survey. The baseline information for this site came from the National ASI Survey, which was carried out for the whole cSAC in 1989. The Natura 2000 survey was also taken into account (2001).

Fixed Dunes (H2130)

The extent of fixed dunes is rated as *favourable* (Table 158C). There is no evidence that there has been a decrease in the area of fixed dune at the site. There is some bare sand due to trampling but this is not having a major impact.

Overall Structure & Functions are rated as *unfavourable-bad* for the fixed dune habitat at Gola Island. Three out of the four monitoring stops failed on the monitoring

criteria. Although there are sheep on the island it seems that they prefer the grassland rather than the fixed dune. As a result of this the fixed dune is undergrazed and the sward is quite rank, with little or no bryophyte cover in some of the stops. The lack of large grazers may lead to a further decrease in species diversity in the future. Finally there is an abundance of agricultural weeds amongst the habitat further adding to a decrease in species diversity.

The future prospects for the fixed dune at Gola Island are rated as *unfavourable-inadequate*. Although the area is isolated and there is no recreational pressure, with little bare sand, the fixed dunes are quite rank. If the rank vegetation continues to increase the seed base of the habitat will diminish and the natural functioning of the habitat will no longer occur.

An overall EU assessment of *unfavourable-bad* is given for the fixed dune habitat. This is based on the structure and functions of the habitat as greater than 75% of the stops failed the monitoring criteria. This therefore affects the future prospects for the site. The overall Irish rating is *unfavourable-declining.*

Table 158C Conservation status of Annex I sand dune habitats at Gola Island

Habitat[1]	**EU Conservation Status Assessment**			**Overall EU conservation status assessment**	**Proposed Irish conservation status system**[2]
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**		
Fixed Dunes (H2130)	Extent	Future Prospects	Structure & Functions	**Unfavourable - Bad**	Unfavourable-Declining
Mobile Dunes (H2120)	Extent Structure & Functions Future Prospects			**Favourable**	Favourable-Maintained
Perennial Vegetation of Stony Banks (H1220)	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 158D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Gola Island

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Fixed Dunes (H2130)	1	3	**Unfavourable - Bad**
Mobile Dunes (H2120)	4	0	**Favourable**
Perennial Vegetation of Stony Banks (H1220)	1	0	**Favourable**

Mobile Dunes (H2120)

The extent of the mobile dunes is rated as *favourable* at the site (Table 158C). Given the small size of the site, the habitat is well represented, especially on the southern side of the spit. Here there is a wide band of mobile dunes, which are composed of healthy *Ammophila arenaria* (Marram Grass).

The structure and functions parameter is rated as *favourable*. A total of four monitoring stops were placed in the mobile dunes at Gola Island and all passed (Table 158D). There were no negative indicators recorded and the *Ammophila arenaria* (Marram grass) was healthy and fresh growing, with plenty of new green shoots at the seaward edge of the habitat.

The future prospects for the mobile dune habitat at this site are considered *favourable.* Although there is always a threat from natural erosion, this is part of the dynamic nature of the habitat. Low recreational pressure is also a positive aspect for the future of the habitat.

The overall EU conservation status of mobile dunes is *favourable* (Table 158C), while the Irish conservation status is rated as *favourable-maintained*.

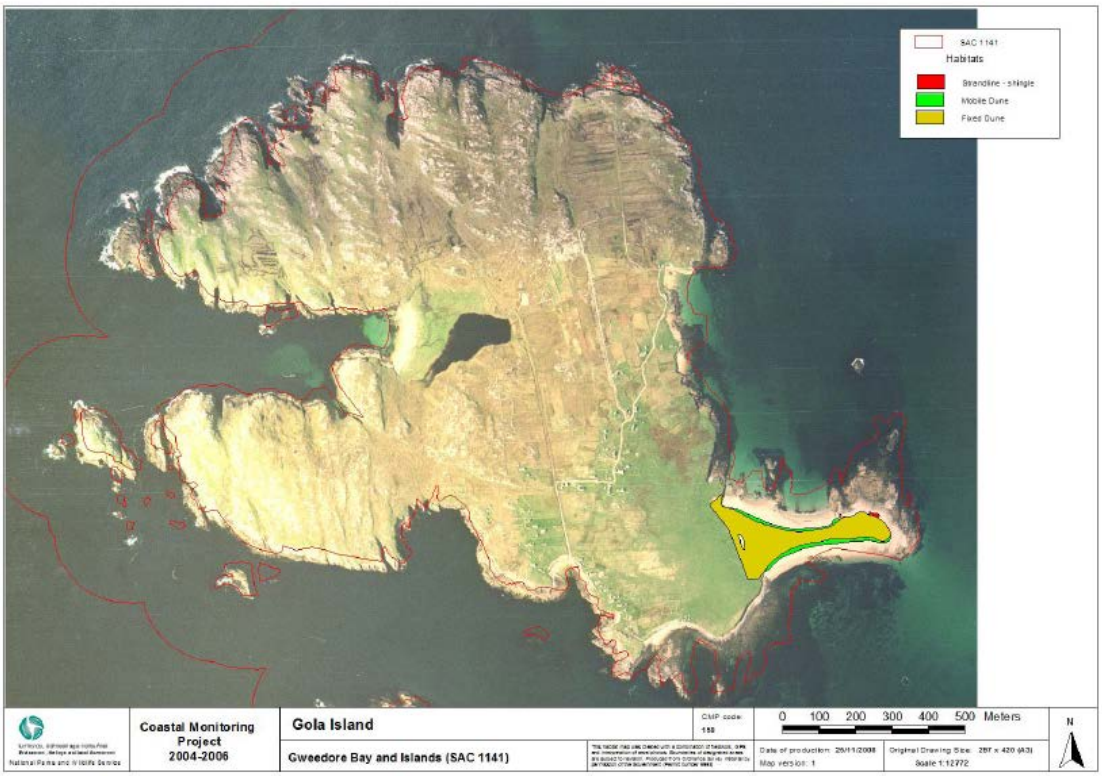
Perennial Vegetation of Stony Banks H1220

The extent of this habitat is very minimal at Gola Island. There is no baseline information on the habitat and it is not known whether there has been a decrease or increase in area. As a result the present conservation assessment is rated as *favourable.*

As the area was so small and no other examples of the habitat were found at the site, only one monitoring stop was carried out. This passed on all targets and there are no negative indicators present. Therefore the structure and functions are rated as *favourable*.

It is difficult to assess the future prospects of such a small area but as the habitat is situated towards the back of an un-vegetated cobble ridge, it is most likely protected from the elements at the present time. The future prospects for the habitat are therefore rated as *favourable*.

The overall EU conservation status for Perennial Vegetation of Stony Banks at the site is *favourable* (Table 158C), while the Irish conservation status is rated as *favourable-maintained*.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Appendix VIII – Lunniagh site report and habitat map from the CMP (Ryle *et al*., 2009)

SITE DETAILS

CMP06 site name: **Lunniagh** CMP06 site code: **159** CMP Map No.: **156**

County: **Donegal** Discovery map: **1** Grid Reference: **B 804 284**

6 inch Map No.: **Do 32 & 23**

Aerial photographs (2000 series): **O0113-B; O0133-B, D; O0134-A, C; O0155-A**

NPWS Site Name: **Gweedore Bay and Islands**

NPWS designation: pNHA: **1191** cSAC: **1191**

Ranger Area: **Donegal**

MPSU Plan: **No**

Report Author: **Kieran Connolly**

SITE DESCRIPTION

Lunniagh sand dunes and machair are within Gweedore Bay and Islands cSAC (1191) on the north-west coast of Donegal and are approximately 6km to the south of Bloody Foreland. Gweedore Bay and Islands cSAC is a large, ecologically diverse site, stretching over approximately 16km of coastline. Much of it is very indented and it encompasses several large intertidal inlets and extensive marine areas. Other habitats that account for significant areas within the site are estuarine sand and mud flats, sea cliffs, islands and coastal heath. Sand dunes also form a major part of the interest in the site and were collectively estimated to account for 16% of the total cSAC area in the site NATURA 2000 data form. Other habitats of relatively small extent within the cSAC include saltmarsh, deciduous woodland and blanket bog.

Lunniagh is the most northerly of seven significant sand dune sites in the cSAC, all of which are included in the present survey. The six other sites are Keadew (site 153 in this report), Cruit Lower (site 154), Kincaslough (site 155), Carnboy (site 156), Derrybeg (site 157) and Gola Island (site 158). Most of these sand dune sites are large and typically have extensive and reasonably intact fixed dunes, in addition to several other Annex I sand dune habitats. A number of the sites, including Lunniagh, have machair among their constituent habitats, while small areas of dune heath - referable

to both 'Decalcified fixed dunes with *Empetrum nigrum*' and 'Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)' are also known from the cSAC.

The sand dunes at Lunniagh extend over approximately 2.5km of west-facing coastline, and extend landwards (eastwards) for over 1km in places. The site is large, with extensive fixed dunes (Table 159A) and a small machair in the southeastern corner of the site. Low dunes lie at the seaward edge of the site, while machair occurs at the landward side of the low dunes, adjacent to a marsh. Much of the terrain is fairly flat, to gently undulating and there are no very tall dune ridges. Outcropping rock is common throughout the site.

Table 159A Areas of EU Annex I habitats mapped at Lunniagh

EU Code	EU Habitat	Area (ha)
H1210	Annual vegetation of driftlines	0.055
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	3.684
H2130	Fixed coastal dunes with herbaceous vegetation	186.723
H2190	Humid Dune Slacks	5.682
H21A0	Machair	42.830
	Total Sand dune	**238.974**

Dune slacks are relatively extensive and are found throughout much of the site as small, discrete areas within the dune grassland.

The rare liverwort *Petalophyllum ralfsii* (Petalwort) has previously been recorded in the most northerly of the dune slacks mapped here. A brief search, carried out in the approximate location (which is shown here as a theme on the site digital map), failed to produce any finds of the species.

A hare (*Lepus timidus* hibernicus) and several choughs (*Pyrrhocorax pyrrhocorax*) were seen during the site visit.

Inismeane (Inis Meáin), an Island of approximately 45ha that lies roughly 1km directly west of Lunniagh, appears from the site aerial photographs to have some sand dune habitat on its sheltered eastern coast. The potential dune area is estimated here - by drawing a polygon over the likely sand dune habitats, which then automatically generates an area - at roughly 6ha. The potential area, while relatively small, is substantial enough to warrant a visit during future monitoring surveys, if a crossing to

the island can be achieved. The island is not included on the NPWS sand dune site inventory, nor was any information received from local conservation staff during the course of this project that confirmed the presence of sand dune habitats there. However, information received from a local landowner at Lunniagh during the site visit suggests that there is indeed a measurable amount of sand dune habitat there. The entire island is included in the Gweedore Bay and Islands cSAC.

Machair (H21A0)

Lunniagh is on the existing NPWS sand dune site inventory as a machair site (Curtis 1991b) and was among the survey sites in the recent Biomar machair survey (Crawford *et al*., 1996), where it was included, along with Derrybeg, under the 'Lunniagh-north and south' site report. It was also included in an earlier machair survey by Bassett (1983) in which it was referred to as Bunlack, and is on the existing NPWS sand dune site inventory as a machair site.

The machair area mapped here in the southeastern corner of the site amounts to 42.83ha in area. The habitat is bordered to the south by saltmarsh vegetation that has formed in the short estuary at the southern boundary of the site and by fixed dunes to the north and west. The precise delimitation of the machair presented some difficulties at the site, insofar as the dune grassland vegetation communities present are common to both fixed dunes and machair – as is typical of many machair sites. The area mapped here as machair is almost delineated by a stream that traverses the dunes to the estuary at the south end of the site, although fixed dunes do comprise a substantial swathe of habitat to the immediate south of the stream. The area mapped as machair consists of a broad sandy plain, significantly flatter than the surrounding dunes and largely devoid of *Ammophila arenaria* (Marram).

In the Biomar machair survey of 1996 (Crawford *et al*.), a large part of the area considered here to be machair is mapped as a mosaic of SD8a and SD8g (NVC communities), in which the former comprises 35% and the latter makes up 65% of the area. Both of these are *Festuca rubra-Galium verum* dune grassland communities. The remaining areas that correspond to the mapped area of machair in the present survey included other SD8 communities, while the area bordering the saltmarsh to the south included MG (mesotrophic grassland) communities

The habitat is quite intensively grazed by sheep, which was reflected in the rather reduced flowering and fruiting of vegetation and very short sward heights recorded in some of the monitoring stops that were carried out. Despite the overgrazed nature of the vegetation, species diversity in the habitat is generally quite high, with each of the four monitoring stops carried out having at least 25 species. The more commonly occurring species included *Cerastium fontanum* (Common mouse-ear), *Euphrasia officinalis* agg. (Eyebright), *Galium verum* (Lady's bedstraw), *Linum catharticum* (Fairy flax), *Prunella vulgaris* (Selfheal), *Sedum acre* (Biting stonecrop), *Selaginella selaginoides* (Lesser clubmoss), *Thymus polytrichus* (Wild thyme) and *Viola tricolor* Ssp. *curtisii* (Wild pansy). There are smaller areas dominated by wet grassland species, the most common of which included *Carex flacca* (Glaucous sedge), *C. nigra* (Common sedge), *Mentha aquatica* (Water mint) and *Potentilla anserina* (Silverweed).

Bryophyte cover was also reasonably high, and the more common moss species included *Brachythecium* sp., *Calliergonella cuspidata*, *Dicranum scoparium* and *Tortula ruraliformis*.

Fixed Dunes (H2130)

The mapped area of fixed dunes, at 186.723ha, represents almost 80% of the total sand dune area at the site, and such extensive dune grassland is typical of a number of sand dune sites in Gweedore Bay and Islands cSAC.

The entire habitat is grazed (but for an enclosed football pitch), although the grazing intensity varies through the site. Sheep are by far the most numerous of grazing livestock and are present throughout, while smaller numbers of cattle are also present. Some of the southern reaches of the fixed dunes, and also the adjacent machair, are heavily grazed, while the northern half is generally grazed less intensively. There are undergrazed areas in the dune grassland where *Ammophila arenaria* (Marram) forms a significant element of the vegetation, although the sward is seldom rank. However, in some places, the only short turf is on, or beside, walking or vehicle tracks through the dunes.

Species diversity was reasonably high over much of the site and most of the monitoring stops carried out had in excess of 15 species. Among the more common species were *Campanula rotundifolia* (Harebell), *Carex arenaria* (Sand sedge), *Centaurium erythraea* (Common centaury), *Cerastium fontanum* (Common mouse-ear), *Euphrasia officinalis* agg. (Eyebright), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Common Bird's-foot-trefoil), *Plantago lanceolata* (Ribwort plantain), *Prunella vulgaris* (Selfheal), *Sedum acre* (Biting stonecrop) and *Thymus polytrichus* (Wild thyme).

Also noted occasionally were *Arabis hirsuta* (Hairy rock-cress), *Coeloglossum viride* (Frog orchid) and *Gymnadenia conopsea* (Fragrant orchid).

Common moss species included *Homalothecium* lutescens, *Hypnum cupressiforme*, *Rhytidiadelphus* squarrosus, *R. triquetrus* and *Tortula ruraliformis*.

Outcropping rock is common throughout much of the dune grassland and the vegetation communities found in close proximity to the rock occasionally included species such as *Antennaria dioica* (Mountain everlasting), *Calluna vulgaris* (Heather) and *Cirsium dissectum* (Meadow thistle). Also found in close association with outcropping rock was *Empetrum nigrum* (Crowberry). The almost invariable proximity of the species at the site to outcropping rock suggests that its presence is not an indication of true dune heath habitat (Decalcified fixed dunes with *Empetrum nigrum*), but a consequence of the presence of acidic rocks. Nevertheless, there are unresolved issues regarding the delimitation of dune heath habitats in Ireland (see main volume of this report) and it would be wise to include Lunniagh in any future national survey of dune heaths.

Also seen (although very rarely) around outcropping rock was *Juniperus communis* (Common juniper). The status of this species in dune grasslands is also a matter of some interest, with the suggestion that some such habitat may be referable to the Annex I habitat '*Juniperus communis* formations on calcareous heaths or grasslands'. Like the dune heath habitats, however, its status has apparently yet to be resolved and it may require a review of the full set of dune sites where it occurs before the outstanding issues are resolved.

In several places, particularly in the eastern side of the side, there are areas where peat soils are exposed and remnants of bog vegetation are seen. Species found in these areas include *Listera ovata* (Common twayblade), *Ophioglossum vulgatum* (Adder's-tongue), *Pinguicula vulgaris* (Common butterwort) and *Selaginella selaginoides* (Lesser clubmoss).

Occasional narrow freshwater channels in the dune grassland support species such as *Caltha palustris* (Marsh-marigold), *Eriophorum* sp. (Cottongrass), *Mentha aquatica* (Water mint), *Menyanthes trifoliata* (Bogbean), *Rorippa nasturtium-aquaticum* (Water-cress) and *Senecio aquaticus* (Marsh ragwort).

The most northerly access road that runs across the site was here taken as a sufficiently accurate boundary of sand dune habitats at the site. North of this point, the headland of Glashagh Lower is sheltered from blown sand by the adjacent rocky shoreline and the steeply inclined tilt of the bedrock that drops away steadily to the south. The vegetation to the north of the access road (and therefore north of the fixed dune boundary) appears to be mostly comprised of heath and coastal grassland communities, although it was not extensively investigated during the site visit.

Habitat maps of the site included in the NPWS cSAC files show sand dune habitats extending as far north as the north-facing headland at Glashagh Lower. These maps are based on sources such as NHA file material, aerial photographs, the Biomar machair survey of 1996 (Crawford *et al.*) and also some site visits. It is likely however, that a sufficiently detailed site visit that would have revealed the true nature of the habitats in this area was not carried out.

A long narrow strip of land within the fixed dunes, over 300m in length and approximately 30m wide, and amounting in total to over 1ha, was excluded from the mapped area of sand dunes and referred instead to 'agricultural grassland'. The area is fenced and has been extensively damaged by its use as a lambing pen or feeding/holding area for livestock. The sward here had been greatly enriched and was extremely weedy in places, while silage bale remnants were strewn throughout the area.

Some of the more extensive bare areas throughout the fixed dunes have been excluded from the habitat, and appear instead as open areas on the digital map that accompanies this report. At least one of these areas is a large sand quarry in which an industrial vehicle was parked during the site visit. The approach to either including or excluding large bare areas within the mapped areas of sand dune habitats has not been entirely consistent throughout this project, and there are other sites where significant tracts of bare ground have been retained within the area of mapped sand dune habitat. A threshold minimum area, above which all bare areas would be excluded from the surrounding dune habitat, was not established. Therefore, future surveys and mapping of this site may, if bare areas are not excluded, result in the reporting of a greater area of habitat than that in the present survey.

Dune Slacks (H2190)

Dune slacks are found throughout the dune grassland and in total comprise 5.682ha of habitat. Some of the slacks at the site have been damaged by sand extraction and the associated movement of industrial vehicles, while intensive grazing has resulted in some poaching of soil in dune slacks, particularly those in the more intensively grazed southern half of the site.

Most of the slacks were of the wetter type and supported species such as *Anagallis tenella* (Bog pimpernel), *Calliergonella cuspidata*, *Carex arenaria* (Sand sedge), *C. flacca* (Glaucous sedge), *Hydrocotyle vulgaris* (Marsh pennywort), *Linum catharticum* (Fairy flax), *Parnassia palustris* (Grass-of-parnassus), *Pinguicula vulgaris* (Common butterwort), *Potentilla anserina* (Silverweed), *Prunella vulgaris* (Selfheal), *Ranunculus flammula* (Lesser spearwort), *Salix repens* (Creeping willow) and *Selaginella selaginoides* (Lesser clubmoss).

Among the more interesting species found were the orchids *Coeloglossum viride* (Frog orchid) and *Gymnadenia conopsea* (Fragrant orchid).

Also noted in a number of dune slacks, and particularly common in the slack in the northeast part of the site where dune slack monitoring stop no. 2 was carried out, was *Ophioglossum vulgatum* (Adder's-tongue).

Mobile Dunes (H2120)

Mobile dune development is very sparse and fragmented over the west-facing coastline. Much of the total mobile dune area is restricted to the southern extreme of the site, on the north shore of the Catheen River estuary, where sand deposition on the north side of the river is leading to some substantial foredune accretion. The mobile dunes here are up to 50m wide in places.

Foredunes along the west-facing coastline have been eroded by wind and wave action and also disturbed by the concentration of amenity activities along the beach and at the end of tracks that terminate near the seaward edge of the site. The mobile dune zone adjacent to the pier (the location of which is marked with a 'miscellaneous' point on the site digital map) near the centre of the site is particularly disturbed. Some of the mapped fragments of mobile dune consist largely of *Ammophila arenaria* (Marram) that has colonised and stabilised bare sand at the edge of previously eroded dune grassland. These are not true accreting foredunes and the lack of mobility of sediment is reflected in the high proportion of dead or unhealthy Marram found in some of these areas.

In addition to *Ammophila arenaria* (Marram), the dominance of which is characteristic of mobile dune vegetation, other species found in the habitat included *Honckenya peploides* (Sea sandwort), *Leymus arenarius* (Lyme–grass) and *Tussilago farfara* (Colt's-foot).

Annual Strandline (H1210)

The mapped area of annual strandline vegetation at the site consists of only a single, very small zone of habitat near the centre of the site. It was considered too small to warrant the assignation of a conservation status assessment.

Shingle Vegetation (H1220)

There were occasional very small bands of sparsely vegetated shingle - none of which were sufficiently large to consider mapping - at the seaward edge of the dunes. Species noted in the habitat included *Honckenya peploides* (Sea sandwort), *Potentilla*

anserina (Silverweed), *Rumex crispus* (Curled dock), and *Tripleurospermum maritimum* (Sea mayweed).

IMPACTS

Activities observed or known to be impacting on the sand dune habitats at Lunniagh are shown in Table 159B.

Substantial areas of the fixed dunes and machair – mostly in the southern half of the site – are adversely affected by overgrazing by livestock. As sheep are the dominant grazers over much of the site, the problem is described under *overgrazing by sheep* (code 142). Cattle were also grazing the dune grassland during the site visit, but they were present in only small numbers and were therefore not considered a significant factor in the overgrazing of parts of the site.

Table 159B Intensity and impact of various activities on sand dune habitats at Lunniagh

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H2130	103	A	-1	2	Inside
H21A0	142	B	-1	30	Inside
H2130	142	B	-1	40	Inside
H2190	142	B	-1	1	Inside
H2130	146	C	-1	4	Inside
H2130	149	C	-1	5	Inside
H2130	171	A	-1	1	Inside
H2130	300	A	-2	1	Inside
H2190	300	A	-2	0.3	Inside
H21A0	402	A	-2	0.5	Inside
H2130	420	B	-1	1	Inside
H2190	420	A	-1	1	Inside
H2130	421	C	-1	0.5	Inside
H21A0	502	A	-2	0.5	Inside
H2130	502	A	-2	1	Inside
H2130	607	A	-2	1	Inside
H2130	608	B	-1	1.5	Inside
H2120	622	C	-1	2	Inside
H2130	622	C	-1	20	Inside
H2120	623	B	-1	0.5	Inside
H21A0	623	B	-1	3	Inside
H2130	623	B	-1	10	Inside
H2190	623	A	-1	0.2	Inside
H2120	900	B	0	Unknown	Inside
H2130	900	A	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

Dune slacks are also included among the habitats affected by overgrazing, as a certain amount of soil poaching was evident in the slacks in the more intensively grazed parts of the site.

The rabbit population at the site is clearly substantial and in places their burrowing activities (code 146) are exacerbating the damaged condition of eroded areas, including those resulting from sand extraction.

Despite the severely overgrazed nature of parts of the dunes, particularly in the southern end, there is some undergrazed fixed dune vegetation (code 149) in the northern part of the site, which although containing a significant proportion of *Ammophila arenaria* (Marram), is never rank. While rabbits are, in places, clearly contributing to overgrazing and erosion of the soil surface, their grazing is probably also contributing to the positive role that grazing has in helping to maintain some short turf in areas where livestock grazing is insufficiently intense for the purposes of conservation management.

A long fenced strip near centre of the site is mapped as improved grassland (code 103), due to the extreme modification that the dune grassland here has undergone. The soil is greatly enriched, with few typical dune species remaining and nitrophilous weed species abundant. Remnants of silage bale feed strewn around the area illustrate the current usage of the strip. Several sheep were penned within the area on the survey date and it appears to be used as a lambing pen.

Supplementary feeding of livestock from ring feeders (code171), while uncommon at the site, has caused some damage in the form of soil poaching and the localised proliferation of nitrophilous weeds, particularly *Cirsium arvense* (Creeping thistle).

Dumping of cars and other machinery (code 420) is a particularly serious problem at the site. In one location alone, over ten vehicles have been dumped in a stream channel in the southern end of the site. Both fixed dunes and dune slacks are affected by the problem, and in the case of the latter, it is regarded as an impact of high intensity, given the limited area of habitat at the site.

Sand extraction (code 300) is taking place in both fixed dunes and dune slacks. In the case of the latter, the activity was noted in only one individual slack, although it is in this one that the rare liverwort *Petalophyllum ralfsii* (Petalwort) has previously been found. The continuation of the activity is therefore particularly undesirable. In addition to the negative affects of sand removal, large industrial vehicles are also used in the operations, which has led to further damage in the fragile habitat. A large sand quarry - marked with a 'miscellaneous' point and an open polygon on the site digital map – is present in the fixed dunes. Heavy machinery used in the sand removal operations was also observed. A further small sand extraction location was noted in the fixed dunes, the location of which is also included as a 'miscellaneous' point on the site digital map.

A number of caravans (code 608) were present in the fixed dunes near the centre of site on the western boundary. Although it does not appear to be a fully serviced caravan site, there was a portable toilet in the area. A single tent was also pitched near the caravan area.

The construction of private dwellings (code 402) is a major issue at Lunniagh, particularly in the machair, where at least one new house has recently been built, and which is within the cSAC boundary. Other houses under construction in the area threaten to cause damage to the habitat through damage from heavy vehicles and the construction of tracks through sensitive habitat. Issues regarding the construction of at least one house have recently been the subject of court proceedings.

Recreational use of the site is considerable and many beach users were present on the survey date. A number of roads and tracks run across the dune grassland towards the beach, while mobile dunes have also suffered damage from trampling and the creation of worn tracks. Amenity usage appears to be focussed at the western side of the site, particularly at the ends of the roads and on the beach. Walking (code 622) has led to the creation of numerous tracks where the soil may be compacted or vegetation worn from the soil surface. It is rated as a problem of low influence in both machair and fixed dunes. At the same time however, some of the more lightly worn tracks contain the only areas of short turf in some of the more undergrazed parts of the site.

The transit of motor vehicles (code 623) has led to some damage in a number of habitats. There are several worn tracks - particularly in the fixed dunes - which extend in some instances across the width of the site, almost to the seaward edge of the dunes. In some cases mobile dunes have also been adversely affected, while the vehicles used in large-scale sand extraction have caused some damage to dune slacks.

There are metalled roads (code 502) running through both fixed dunes and machair, which are estimated to account for 1ha and 0.5ha of the habitats respectively. In each case, it is regarded as an irreparable negative influence on the habitats.

Some occasional dumping of domestic waste (code 421) was noted in the fixed dunes

A football field (code 607) with a stand, changing rooms and surrounding concrete wall is excluded from the cSAC and is mapped here as amenity grassland. The pitch is at the eastern side of the site, adjacent to the access road that runs across the fixed dunes. An unfenced soccer pitch near the northern boundary of the fixed dunes was mapped in the Biomar machair survey (Crawford *et al*., 1996), but was no longer in evidence during the present survey.

Natural erosion (code 900) has accounted for a substantial area of fixed dunes, which now form the seaward boundary of the dunes over much of this stretch of coastline. Foredunes are very fragmented and limited in extent and substantial stretches of the seaward dune edge have a steep front dune face, illustrating the erosion that has previously occurred. In places, fixed dune turf has slumped onto the steep front face of the dunes. As is typical of this impact, it is all but impossible to provide an estimate of the areas of habitats affected and they are therefore recorded here as 'unknown'. Because it refers to a natural process, the influence is described as neutral (Table 159B).

CONSERVATION STATUS

The overall conservation status assessment of each habitat at Lunniagh is based on a combination of *Habitat Extent, Structure & Functions*, and *Future Prospects* assessments (Table 159C). The structure and functions assessments of the habitats were based on monitoring stops, the results of which are shown in Table 159D.

As Lunniagh is only one of seven substantial sand dune sites within Gweedore Bay and Islands cSAC, much of the information contained in the NATURA 2000 files for the site - where habitat extent data is estimated as the total area within the site, rather than on a site-by-site basis – is of limited use for the purposes of comparison with the present data. As a result, the assessments – particularly those of habitat extent (area) - are based, at least in part, on the current condition of habitats.

Machair (H21A0)

Extent (area) is considered to be *unfavourable*, as some habitat has recently been lost to house building in the southeastern corner of the site. As the total loss of area amounts to less than the 1% per year threshold (over the course of the reporting cycle, which in this case is ten years) that would necessitate an *unfavourable-bad* assessment, the appropriate assessment is *unfavourable-inadequate*.

All four monitoring stops carried out in the habitat passed the required standard, indicating *favourable* structure and functions.

Future prospects for the habitat must be considered *unfavourable-bad*, as the construction of housing appears to be ongoing at the site. In such a situation and with only a quite limited area of machair, the threats to the habitat must be considered severe.

As one of the individual parameters of conservation status assessment (in this case future prospects) is considered to be *unfavourable-bad*, the overall assessment for the habitat is also *unfavourable-bad*.

As the construction of houses in the habitat in recent years has brought about a reduction in total habitat area, the assessment chosen under the Irish system of conservation status assessment is *unfavourable-declining*.

Table 159C Conservation status of Annex I sand dune habitats at Lunniagh

Habitat[1]	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system[2]
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**		
Machair (H21A0)	Structure & functions	Extent	Future prospects	**Unfavourable - Bad**	**Unfavourable -declining**
Fixed Dunes (H2130)	Structure & functions	Extent/ Future prospects		**Unfavourable - Inadequate**	**Unfavourable - declining**
Dune Slack (H2190)		Extent/ Structure & functions/ Future prospects		**Unfavourable - Inadequate**	**Unfavourable - declining**
Mobile Dunes (H2120)		Extent / Future prospects	Structure & functions	**Unfavourable - Bad**	**Unfavourable - unchanged**

[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)

Lunniagh was included in the recent Biomar machair survey, where it is referred to as Lunniagh North (Crawford *et al*., 1996) and also in the earlier survey of machair sites by Bassett (1983), where it was referred to as Bunlack. Bassett regarded the site as being 'of some conservation interest' and applied a rating of 'Grade III'. At the time of that survey however, it appears the machair was ungrazed.

The usefulness of the Biomar machair survey data for the purposes of comparison with the present survey are limited by the fact that the mapping of habitats in that survey was based on the NVC system of classification, rather than on the occurrence of EU Annex I habitats. However, the vegetation quadrats carried out deal with all of the habitat attributes contained in the current monitoring stop protocol (with the exception of 'flowering and fruiting') and are therefore useful as possible indicators of change at the site over the past ten years. The habitat map produced as part of the 1996 survey also shows the approximate locations of all quadrats carried out, and therefore enables the identification of those that are within a reasonable proximity of the machair monitoring stops of the present survey.

Some of the quadrats from the earlier survey did not correspond to any of the monitoring stops of this survey, such as one carried out in a MG11d map zone - a Festuca *rubra-Agrostis stolonifera-Potentilla* anserina community (*Carex nigra* sub-

community) that has no equivalent among the present monitoring stops, all of which reflect drier *Festuca rubra-Galium verum* grassland types.

Other quadrats that do correspond quite well to some of the present monitoring stops, both in proximity and grassland vegetation communities, were very similar in species diversity and other attributes. Most of the quadrats from the earlier survey, had, like the present monitoring stops, in excess of 20 species, including six or more from the monitoring stop prescribed list. Herb heights of 2-3cm were also similar to those recorded in the present survey, while typically high percentage moss cover and low cover of negative indicator species are attributes also shared by the two sets of results.

In summary, it can be said that there have been no obvious significant changes in the habitat attributes common to both protocols in the intervening period between the two surveys.

Fixed Dunes (H2130)

Habitat extent is rated as *unfavourable-inadequate*, as there are a number of impacts and activities that have resulted in a loss of area within the habitat. Although some of these, such as the development of a football ground with associated facilities, pre-date the current time period on which the assessment of habitats is based (1996-present), others such as sand extraction and the modification of dune habitat into improved agricultural grassland are ongoing at the site and must be accounted for in the current habitat extent assessment.

All eight monitoring stops carried out in the habitat passed the overall criteria, indicating *favourable* structure and functions. Species diversity was generally quite high, despite the existence of both overgrazed and undergrazed grassland at the site. Most of the monitoring stops had some cover of negative indicator species - usually comprised of *Senecio jacobaea* (Common ragwort) and occasionally also *Cirsium arvense* (Creeping thistle) - although only one of the stops failed on this particular attribute. In that instance, the excessive cover of *S. jacobaea* consisted of low-growing, tightly grazed plants.

Future prospects for the habitat are considered to be *unfavourable-inadequate*, as damaging impacts and activities such as sand extraction and overgrazing are ongoing and likely to continue. As the affected areas constitute a relatively small proportion of the total habitat area, the threats can be considered as less than severe.

As the three individual parameters of conservation status assessment are a combination of *favourable* and *unfavourable-inadequate* ratings, the overall conservation status assessment for the habitat is *unfavourable-inadequate*.

The rating considered most appropriate under the Irish system of assessment is *unfavourable-declining*, as large-scale sand extraction seems to have been carried out at the site over a prolonged period, leading to a constant decline in the habitat condition.

Dune Slacks (H2190)

The large-scale sand extraction that has affected the most northerly slack at the site is thought to have decreased the area of that slack by a measurable degree. Habitat extent (area) is therefore rated as *unfavourable-inadequate*. There are no other clear indications of recent losses of dune slack habitat at the site.

All eight monitoring stops carried out in dune slacks passed the overall criteria, which would ordinarily result in a *favourable* assessment of structure and functions. However, because a large slack in the northern end of the site has been substantially damaged by large-scale sand extraction activities, the assessment is amended to *unfavourable-inadequate* (Table 159D).

Future prospects are rated as *unfavourable-inadequate* as damaging sand extraction activities are continuing in the most northerly slack at the site and likely to result in further damage to the habitat. Dune slack is also the habitat that has been most affected by the large-scale dumping of cars and machinery. The number of dumped vehicles seen during the site visit suggests that the problem is not regularly addressed by the relevant authorities.

As each of the individual parameters of conservation status assessment is *unfavourable-inadequate*, the overall assessment is also *unfavourable-inadequate*.

The rating thought most appropriate under the Irish system of assessment is *unfavourable-declining*, as sand extraction activities have most likely resulted in a steady decline in the habitat condition.

Table 159D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Lunniagh

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Machair (H21A0)	4	0	**Favourable**
Fixed Dunes (H2130)	8	0	**Favourable**
Dune Slacks (H2190)	8	0	**Favourable***
Mobile Dunes (H2120)	2	2	**Unfavourable-bad**

* Amended to *Unfavourable-inadequate* (see above)

Mobile Dunes (H2120)

Mobile dune development at the site is sparse and fragmented and much of the total area is restricted to an area at the southern extreme of the site, on the north shore of the Catheen River estuary. Because of the lack of recent data with which the present results may be meaningfully compared, there is no direct evidence of a recent loss of area. However, based on the current limited area and restricted zonation of habitat, extent (area) is rated as *unfavourable-inadequate*.

As only two of the four monitoring stops carried out in the habitat passed the overall target criteria - indicating a failure rate of 50% - structure and functions are rated *unfavourable-bad*. One of the failed stops had an excessive cover of negative indicator species - accounted for by a combination of *Cirsium arvense* (Creeping thistle) and *Senecio jacobaea* (Common ragwort), while the other had an excessive amount of unhealthy *Ammophila arenaria* (Marram).

Future prospects are rated as *unfavourable-bad*, as there is little indication of any substantially accreting foredune habitat at the site. The beach part of the site, adjacent

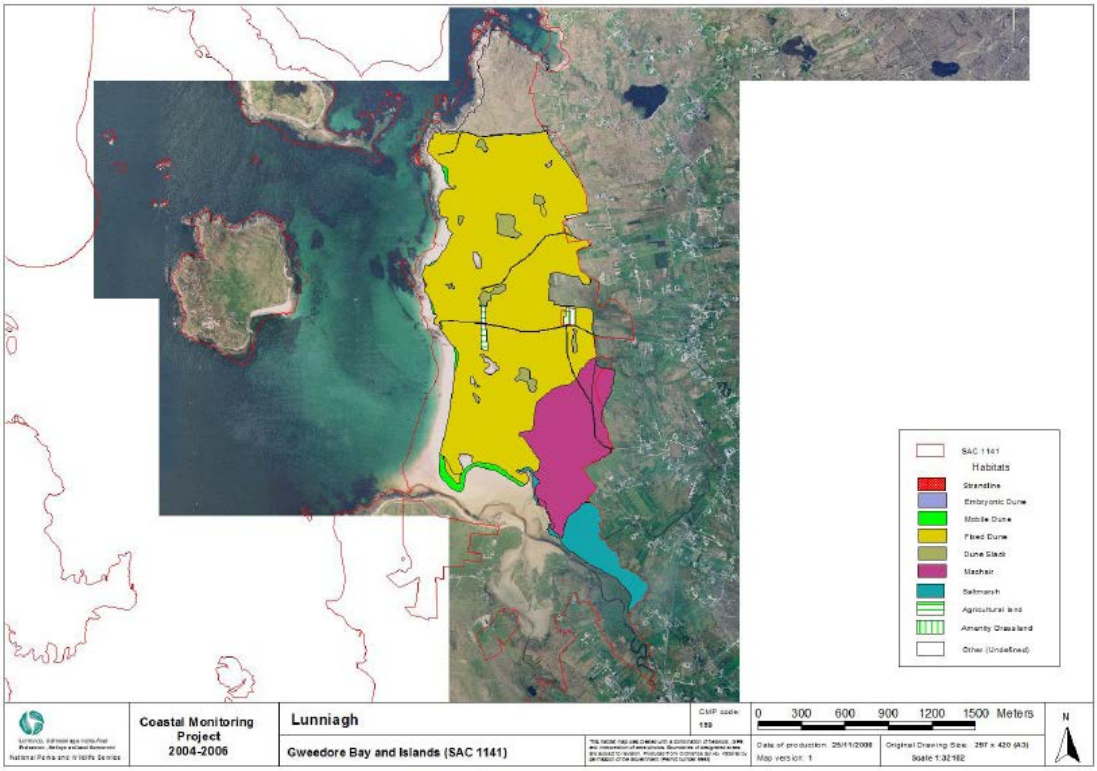
to the fragmented mobile dunes, also sees the greatest intensity of recreational activities at the site.

As one of the individual parameters of conservation status assessment (in this case structure and functions) is considered to be *unfavourable-bad*, the overall assessment for the habitat is also *unfavourable-bad.*

The assessment thought most appropriate under the proposed Irish system is *unfavourable-unchanged*, reflecting the probable long-term existence of restricted habitat extent and zonation.

Annual Strandline (H1210)

The area of strandline vegetation (Annual vegetation of driftlines) mapped, was considered too small to warrant an assessment of conservation status.


SAC 1141
Habitats
Strandline
Embryonic Dune
Mobile Dune
Fixed Dune
Dune Slack
Machair
Saltmarsh
Agricultural land
Amenity Grassland
Other (Undefined)
Coastal Monitoring Project 2004-2006
Lunniagh
Gweedore Bay and Islands (SAC 1141)
0 300 600 900 1200 1500 Meters
N

APPENDIX IX – SITE REPORT AND HABITAT MAPS FOR KINCASLOUGH FROM SAND DUNES MONITORING PROJECT (DELANEY *ET AL.*, 2013)

SITE 155 KINCASLOUGH

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

Kincaslough is a medium-sized site located 9 km north of Dunglow, on the north-west coast of Donegal. It comprises a series of small coves scattered around Drumnacart headland and as well as a sheltered sandy bay where Mullaghderg beach is situated, between the rocky headlands at Mullaghderg and Drumnacart. The site forms part of the Gweedore Bay and Islands SAC (SAC 001141). Seven Annex I sand dune habitats (* indicates a priority habitat) were recorded during the CMP: **1210 Annual vegetation of drift lines, 2110 Embryonic shifting dunes, 2120 Marram dunes (white dunes), *2130 Fixed dunes (grey dunes), 2170 Dunes with creeping willow, 2190 Humid dune slacks** and ***21A0 Machairs** (Ryle *et al.*, 2009). Other Annex I habitats associated with the sand dunes as Kincaslough include **1170 Reefs, *2140 Decalcified fixed dunes with *Empetrum nigrum*, *2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), 4030 European dry heaths** and **5130 *Juniperus communis* formations on heaths or calcareous grasslands.** A number of rare plants have been recorded within the Gweedore Bay and Islands SAC (SAC 001141), yet none were noted to occur at Kincaslough. The Annex I bird species, *Pyrrhocorax pyrrhocorax* (Chough), has however been recorded here, and this species along with the Annex V species the Irish hare (*Lepus timidus hibernicus*), were both recorded during the SDM. Kincaslough is a popular amenity area, with a car park and access road provided for visitors. The site is also used for agriculture, with cattle grazing and some cultivation still taking place in fenced parts of the ***2130 Fixed dunes (grey dunes)**. There is a long history of this type of management on the site.

2 CONSERVATION ASSESSMENTS

2.1 Overview

Kincaslough was surveyed on the 7th and 8th of September 2011. Of the seven habitats recorded on the site during the baseline survey, six were recorded during the SDM. ***21A0 Machairs** was not recorded at Kincaslough in 2011. The habitats found at Kincaslough in 2011 and the results of the conservation assessments are presented in Table 1. The **2170 Dunes with creeping willow**

habitat was below the minimum monitoring area and was therefore not assessed. **2110 Embryonic shifting dunes** and **2190 Humid dune slacks** were assessed as Favourable, while **1210 Annual vegetation of drift lines, 2120 Marram dunes (white dunes)** and ***2130 Fixed dunes (grey dunes)** were assessed as Unfavourable-Inadequate.

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

Habitat	Area	Structure & Functions	Future Prospects	Overall result
1210 Annual vegetation of drift lines	Unfavourable-Inadequate (Deteriorating)	Favourable (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Deteriorating)
2110 Embryonic shifting dunes	Favourable (Improving)	Favourable (Stable)	Favourable (Improving)	Favourable (Improving)
2120 Marram dunes (white dunes)	Favourable (Improving)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Improving)
*2130 Fixed dunes (grey dunes)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)
2190 Humid dune slacks	Favourable (Stable)	Favourable (Stable)	Favourable (Stable)	Favourable (Stable)

2.1.1 Area

The area of each habitat according to the baseline maps, the revised baseline maps and the Sand Dunes Monitoring Project are presented in Table 2. The baseline areas of ***2130 Fixed dunes (grey dunes)**, **2190 Humid dune slacks** and ***21A0 Machairs** were amended after Kincaslough was visited in 2011. The area of **2190 Humid dune slacks** was increased slightly at the expense of ***2130 Fixed dunes (grey dunes). *21A0 Machairs** were identified at this site by Curtis (1991), but when the site was visited in 2011, the habitat was reassessed as ***2130 Fixed dunes (grey dunes)** as several of the features of the ***21A0 Machairs habitat** described in literature did not apply to the habitat at Kincaslough. Conditions are most suitable for ***21A0 Machairs** in exposed, west and southwest facing situations (Gaynor, 2008), but Kincaslough faces north-northwest and it is quite sheltered from prevailing winds by large dune ridges and headlands. Most of the area mapped as ***21A0 Machairs** during the baseline survey is very dry, and the water table only appears to be close to the surface in the vicinity of the small pond, so the flatter area of the habitat does not conform to the machair plain described by Gaynor (2008). Sand-binding species are infrequent in ***21A0 Machairs** (Curtis, 1991), but *Ammophila arenaria* was frequent to occasional in much of the area mapped as ***21A0 Machairs**. The proportion of the site that had been mapped as ***21A0 Machairs** was small compared to other ***21A0 Machairs** systems (Angus, 2006), and the dune system at Kincaslough is very well developed. Sand hills extend into the area originally mapped as ***21A0 Machairs.** Because it was difficult to identify clear differences between the ***2130 Fixed dunes (grey dunes)** and ***21A0 Machairs,** they were merged and treated as ***2130 Fixed dunes (grey dunes)** during the SDM. The total area of Annex I sand dune habitats at Kincaslough had increased since the baseline survey and this was due to accretion and succession.

Table 2. Areas of Annex I dune habitats originally mapped at Kincaslough 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	0.03	0.03	0.09
2110 Embryonic shifting dunes	0.06	0.06	0.14
2120 Marram dunes (white dunes)	0.81	0.81	1.59
*2130 Fixed dunes (grey dunes)	62.62	81.59	82.11
2170 Dunes with creeping willow	0.03	0.03	0.03
2190 Humid dune slacks	1.00	1.09	1.09
*21A0 Machairs	12.24	0.00	0.00
Total	76.79	83.61	85.05

2.1.2 Structure and Functions

Structure and Functions were assessed for five Annex I sand dune habitats mapped at Kincaslough. **2170 Dunes with creeping willow** was not assessed as it was below the minimum monitoring area. 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 passed in the Structure and Functions assessment for **1210 Annual vegetation of drift lines**, **2110 Embryonic shifting dunes** and **2190 Humid dune slacks,** therefore giving them a Favourable status for Structure and Functions. Two criteria failed for ***2130 Fixed dunes (grey dunes)** and one criterion failed the assessment for **2120 Marram dunes (white dunes)**, and they were assessed as Unfavourable-Inadequate.

Table 3. Annex I sand dune habitats at Kincaslough 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	2	7	0
2120 Marram dunes (white dunes)	4	7	1
*2130 Fixed dunes (grey dunes)	12	11	2
2190 Humid dune slacks	4	11	0

2.1.3 Future Prospects

Impacts and activities recorded at Kincaslough are presented in Table 4. Impact codes are assigned according to Ssymank (2010). Rock armour was recorded as a negative impact for **1210 Annual vegetation of drift lines, 2120 Marram dunes (white dunes)** and ***2130 Fixed dunes (grey dunes)**, and as a neutral impact for the other three Annex I sand dune habitats found during the SDM. Other negative impacts recorded for ***2130 Fixed dunes (grey dunes)** include undergrazing, off-road driving, dumping and problematic non-native species. Non-intensive cattle grazing was recorded as either a neutral or positive impact depending on the habitat it occurred within.

Table 4. Impacts recorded in Annex I sand dune habitats at Kincaslough 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	High	Negative	5	Outside
2110	J02.12.01	Rock armour	-	Neutral	0	Outside
2120	A04.02.01	Non intensive cattle grazing	Low	Neutral	1	Inside
2120	J02.12.01	Rock armour	Low	Negative	5	Outside
*2130	A02.03	Arable plots	High	Neutral	1	Inside
*2130	A04.02.01	Non intensive cattle grazing	Low	Positive	5	Inside
*2130	A04.03	Undergrazing	Low	Negative	60	Inside
*2130	D01.02	Access road	High	Neutral	1	Inside
*2130	D01.03	Car park	High	Neutral	1	Outside
*2130	G01.02	Walking	Medium	Neutral	30	Inside
*2130	G01.03.02	Off-road driving (cars on dunes)	Medium	Negative	5	Inside
*2130	G05.09	Fencing	Low	Neutral	1	Inside
*2130	H05.01	Dumping	Medium	Negative	1	Inside
*2130	I01	*Hippophae rhamnoides*	High	Negative	1	Inside
*2130	I02	*Pteridium aquilinum*	Low	Neutral	1	Inside
*2130	J02.12.01	Rock armour	Medium	Negative	1	Outside
*2130	K01.01	Erosion	Low	Neutral	5	Inside
2170	J02.12.01	Rock armour	-	Neutral	0	Outside
2190	A04.02.01	Non intensive cattle grazing	Medium	Positive	70	Inside
2190	J02.12.01	Rock armour	-	Neutral	0	Outside

2.2 Annex I habitat assessments

The conservation status of the Annex I habitats at Kincaslough 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 in the north-east of Kincaslough, and is closely associated with the rocky coves on the headland.

Area

1210 Annual vegetation of drift lines increased from 0.03 ha during the CMP to 0.09 ha during the SDM. This is due to accretion and plant colonisation of drift line material. Despite the apparent gain in habitat, 0.005 ha of the habitat was lost since the baseline survey, when rock armour was put in place as part of works to improve access to the beach. This equates to a loss of 5.6% of the total area present in 2011. During the CMP, Area was assessed as Favourable. Area was assessed as Unfavourable-Inadequate (deteriorating) 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 on the basis of a single monitoring stop. Structure and Functions were assessed as Favourable (stable) during the SDM.

Future Prospects

Rock armour was recorded as a negative impact affecting 5% of the habitat. The rock armour occupies part of the site which was previously composed of **1210 Annual vegetation of drift lines.** Because of the presence of the rock armour, the area previously occupied by **1210 Annual vegetation of drift lines** will be unable to recover. During the CMP, Future Prospects were recorded as Unfavourable-Inadequate because of trampling. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Conservation assessment

Area and Future Prospects were assessed as Unfavourable-Inadequate, while Structure and Functions were assessed as Favourable. During the CMP, two of the three parameters were assessed as Favourable and the remaining parameter was assessed as Unfavourable-Inadequate. The conservation status of **1210 Annual vegetation of drift lines** was assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

2.2.2 2110 Embryonic shifting dunes

2110 Embryonic shifting dunes were found in the rocky coves in the north-eastern part of Kincaslough and at the far western side of the beach.

Area

The area of **2110 Embryonic shifting dunes** has increased from 0.06 ha during the CMP to 0.14 ha during the SDM. There was no indication of anthropogenic loss in the habitat. During the CMP, Area was assessed as Unfavourable-Inadequate because of the potential effects of sand extraction. Sand extraction was not evident in 2011 and Area was assessed as Favourable (improving) 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

Rock armour, with a neutral effect, was the only impact recorded for **2110 Embryonic shifting dunes**. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate as sand extraction was believed to be occurring. Walking and trampling were also recorded as negative impacts. There was no evidence of sand extraction in 2011, and Future Prospects were assessed as Favourable (improving).

Conservation assessment

All three parameters were assessed as Favourable during the SDM. During the CMP, Area and Future Prospects were assessed as Unfavourable-Inadequate and Structure and Functions were assessed as Favourable. The conservation status of **2110 Embryonic shifting dunes** was assessed as Favourable (improving) during the SDM.

2.2.3 2120 Marram dunes (white dunes)

A continuous ridge of **2120 Marram dunes (white dunes)** was located adjacent to Mullaghderg beach, and smaller patches of the habitat occurred in the coves on the headland.

Area

The area of **2120 Marram dunes (white dunes)** increased from 0.81 ha during the CMP to 1.59 ha during the SDM. This is the result of accretion and succession at Mullaghderg beach, and may represent a recovery after the cessation of sand extraction. Area was assessed as Unfavourable-Inadequate during the CMP due to natural erosion and sand extraction. During the SDM, Area was assessed as Favourable (improving).

Structure and Functions

Only one criterion failed in the Structure and Functions assessment, and this assessed interference with site dynamics. Rock armour has been placed close to the north-eastern tip of the **2120 Marram dunes (white dunes)** as part of improvements to the access point. During the CMP, Structure and Functions were assessed as Unfavourable-Bad because of poor habitat health, and this may have been related to sand extraction. As only one criterion failed during the CMP, it would have been assessed as Unfavourable-Inadequate under the current methodology. Structure and Functions were assessed as Unfavourable-Inadequate (stable) during the SDM.

Future Prospects

Rock armour was assessed as a low intensity, negative impact affecting 5% of the habitat in 2011. No negative effect on the **2120 Marram dunes (white dunes)** has yet been observed, but the presence of the structure remains a threat. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate because of sand extraction and erosion. Trampling was also listed as an impact. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Conservation assessment

Area was assessed as Favourable, while the remaining parameters were assessed as Unfavourable-Inadequate. This is an improvement on the situation during the CMP when Area and Future Prospects were assessed as Unfavourable-Inadequate. Structure and Functions were assessed as Unfavourable-Bad, but would have been assessed as Unfavourable-Inadequate under the current methodology. The conservation status of **2120 Marram dunes (white dunes)** was assessed as Unfavourable-Inadequate (improving) during the SDM.

*2.2.4 *2130 Fixed dunes (grey dunes)*

The most extensive habitat at Kincaslough was ***2130 Fixed dunes (grey dunes).** It includes areas which have been described elsewhere as ***21A0 Machairs,** but the two habitats could not be distinguished from each other on the basis of management, morphology or vegetation, so it was all treated as ***2130 Fixed dunes (grey dunes)** during the SDM.

Area

The area of ***2130 Fixed dunes (grey dunes)** increased from 81.59 ha during the CMP to 82.11 ha during the SDM. During the CMP, Area was assessed as Unfavourable-Inadequate because of houses having been built in the dunes, encroachment by *Hippophae rhamnoides*, and loss of habitat due to erosion exacerbated by human activities. There are no signs of any further loss since the baseline survey was carried out, but the loss of habitat to housing within the SAC on ***2130 Fixed dunes (grey dunes)** has not been reversed, so Area was assessed as Unfavourable-Inadequate (stable) during the SDM.

Structure and Functions

Two criteria failed in the Structure and Functions assessment. The proportion of tall vegetation in the sward was too large, and there was some rank vegetation. There was damage due to disturbance as off-road driving occurs in the north of the site and there was evidence dumping of industrial materials in a large hollow. An area from which sand had been extracted in the past appeared to be recovering. Two criteria were allowed to pass on expert judgement. A small amount of rock armour had been put in place, but it had not yet caused scouring or habitat loss. There was a high cover of *Pteridium aquilinum* at one stop; however *Pteridium aquilinum* was not extensive or dense at Kincaslough, and it was felt that failing that criterion would be unduly harsh. During the CMP, Structure and Functions were assessed as Unfavourable-Inadequate because of lack of typical species and high cover of negative indicator species. Structure and Functions were assessed as Unfavourable-Inadequate (stable) during the SDM.

Future Prospects

Undergrazing, dumping, driving on the habitat, invasive *Hippophae rhamnoides* and rock armour were recorded as negative impacts at Kincaslough. *Pteridium aquilinum* was also present, but its current extent is not considered to represent a threat. The road and car park are recorded as neutral impacts as they reduce the amount of driving on the dunes but they also facilitate access to them, with some drivers leaving the road to penetrate further into the dune system. There are long-established arable plots within the ***2130 Fixed dunes (grey dunes)** habitat, but these are isolated and are not considered to represent a threat. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate because of the threats of development and changing farming practices. Impacts recorded at that time included cultivation, overgrazing, undergrazing, agricultural restructuring, stock feeding, sand extraction, housing, disposal of household waste, storage of materials, recreational activities and the presence of *Hippophae rhamnoides*. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Conservation assessment

There was no change in the assessment of any of the parameters between the baseline survey and the SDM. The conservation status of ***2130 Fixed dunes (grey dunes)** was assessed as Unfavoruable-Inadequate (stable) during the SDM.

2.2.5 2170 Dunes with creeping willow

The area of **2170 Dunes with creeping willow** was below the minimum monitoring area, and no assessment was carried out. The area had not changed since the baseline survey and no negative impacts were recorded.

2.2.6 2190 Humid dune slacks

There are four **2190 Humid dune slacks** at Kincaslough. Two are located in the north-eastern part of the site, behind Drumnacart headland, and two are located in the dunes behind Mullaghderg beach.

Area

There was no change in the area of 1.09 ha for the **2190 Humid dune slacks** at Kincaslough. 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 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 impacts on **2190 Humid dune slacks** recorded at Kincaslough were cattle grazing and rock armour, with cattle grazing having a medium intensity positive effect on the habitat. Rock armour had a neutral effect. Future Prospects were assessed as Favourable during the CMP, when walking and grazing were the only impacts recorded. During the SDM, Future Prospects were assessed as Favourable (stable).

Conservation assessment

All of the parameters were assessed as Favourable both during the CMP and the SDM. The conservation status of **2190 Humid dune slacks** was assessed as Favourable (stable) during the SDM.

*2.2.7 *21A0 Machairs*

***21A0 Machairs** was not assessed at Kincaslough during the SDM. This was not a loss of habitat however, rather, the area where this habitat was mapped during the CMP was determined to be more characteristic of ***2130 Fixed dunes (grey dunes)** when visited during the SDM and was therefore remapped as such.

3 DISCUSSION

3.1 Recreation

The effects of recreation are focussed in the north-eastern part of the site, where a road gives good access to the dunes. Sports training is carried out here, and this can attract large numbers of people, many of whom park on the ***2130 Fixed dunes (grey dunes)**. There is an access road leading to a car park with a boardwalk to the main beach, but tracks through the ***2130 Fixed dunes (grey dunes)** indicate that cars frequently leave the road and drive through the habitat. Vehicle damage has been shown to reduce the number and diversity of plant species in coastal areas (Kindermann and Gormally, 2010). Placing boulders alongside roads and car parks has reduced the negative effects of off-road driving at other sites where grazing animals require an open landscape.

3.2 Agriculture

Non-intensive cattle grazing is an appropriate management regime for the dunes at Kincalsough. A very slight decrease in the area of ***2130 Fixed dunes (grey dunes)** with tall vegetation height would have a beneficial impact. Some cultivation occurs within the sand dunes, but the area where this occurs is very limited and shows no sign of having expanded since the baseline survey was carried out. Because it is part of the historic management of the site, it is considered to be a local feature of interest and does not detract from the conservation value of the site. There were no signs of interference with the surrounding ***2130 Fixed dunes (grey dunes)** due to the use of fertilizers or herbicides during the survey in 2011.

3.3 Rock armour

Rock armour has been put in place to protect the access point from the car park to the beach. The rock armour occupies a limited area, but has caused the loss of part of the **1210 Annual vegetation of drift lines habitat**. Hard sea defences alter the energy of waves which reach the shoreline and erosion can occur at the ends of hard structures where they meet soft substrates such as unconsolidated sand. The area should be monitored closely to observe whether any scouring takes place at the edge of the defences.

3.4 *Hippophae rhamnoides*

Hippophae rhamnoides is an invasive non-native shrub which is sometimes planted to stabilise sand dunes where they are considered to be prone to erosion. It forms dense stands and can expand quickly if left unchecked, excluding typical sand dune flora where it becomes established. Examination of aerial photographs suggests that the stands have increased in size since 1995. The mapping carried out in 2011 will facilitate monitoring of the spread of *Hippophae rhamnoides* in future.

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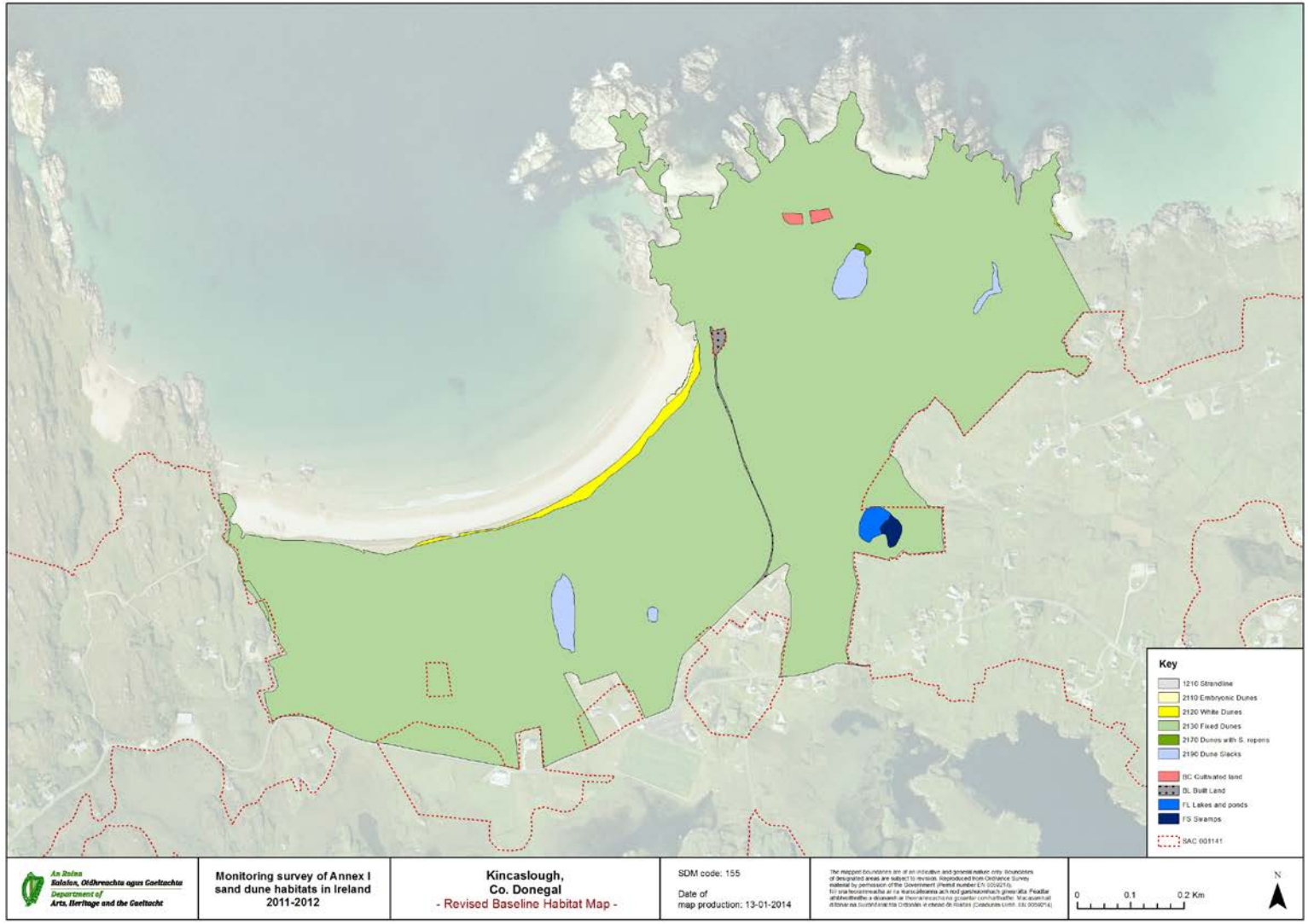
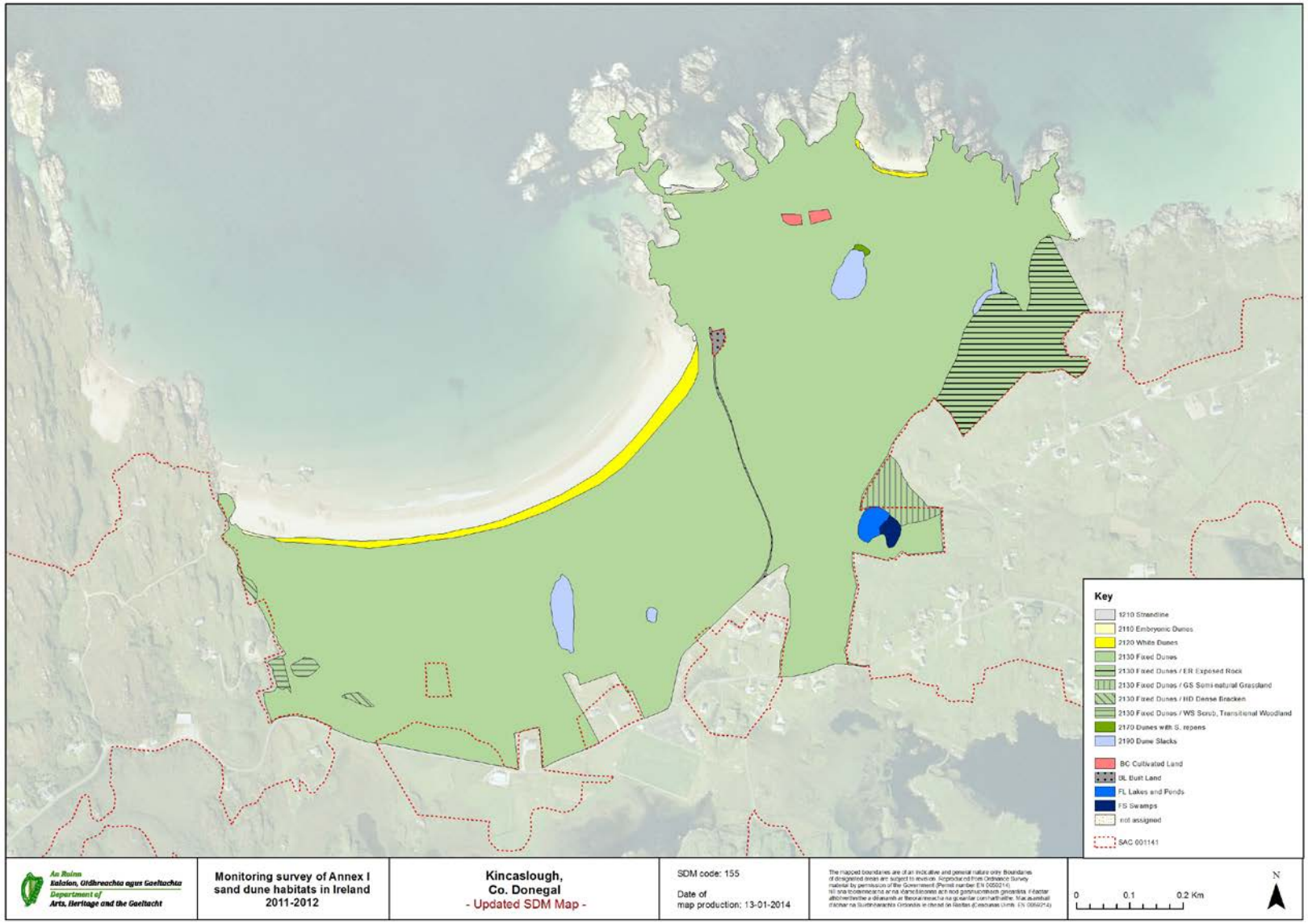

Key
1210 Strandline
2110 Embryonic Dunes
2120 White Dunes
2130 Fixed Dunes
2170 Dunes with S. repens
2190 Dune Slacks
BC Cultivated land
BL Built Land
FL Lakes and ponds
FS Swamps
SAC 001141
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Monitoring survey of Annex I sand dune habitats in Ireland 2011-2012
Kincaslough, Co. Donegal
- Revised Baseline Habitat Map -
SDM code: 155
Date of map production: 13-01-2014
0 0.1 0.2 Km
N


Key
1210 Strandline
2110 Embryonic Dunes
2120 White Dunes
2130 Fixed Dunes
2130 Fixed Dunes / ER Exposed Rock
2130 Fixed Dunes / GS Semi-natural Grassland
2130 Fixed Dunes / HD Dense Bracken
2130 Fixed Dunes / WS Scrub, Transitional Woodland
2170 Dunes with S. repens
2190 Dune Slacks
BC Cultivated Land
BL Built Land
FL Lakes and Ponds
FS Swamps
not assigned
SAC 001141
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
Kincaslough, Co. Donegal
- Updated SDM Map -
SDM code: 155
Date of map production: 13-01-2014
0 0.1 0.2 Km
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APPENDIX X – SITE REPORT AND HABITAT MAPS FOR DERRYBEG FROM SAND DUNES MONITORING PROJECT (DELANEY *ET AL.*, 2013)

SITE 157 DERRYBEG

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

Derrybeg is a large site located approximately 1 km west of the towns Derrybeg and Bunbeg, east of Gweedore Bay in north-west Donegal. It stretches from Emlin Rock in the north to the beach at Inishcoole in the south. It is part of the Gweedore Bay and Islands SAC (SAC 001141). Seven Annex I sand dune habitats (* indicates a priority habitat) were recorded during the CMP: **1210 Annual vegetation of drift lines, 2110 Embryonic shifting dunes, 2120 Marram dunes (white dunes), *2130 Fixed dunes (grey dunes), 2170 Dunes with creeping willow, 2190 Humid dune slacks** and ***21A0 Machairs** (Ryle *et al.*, 2009)**.** Other Annex I habitats associated with the sand dunes at Derrybeg include **1170 Reefs, 1410 Mediterranean salt meadows (*Juncetalia maritimi*), *2140 Decalcified fixed dunes with *Empetrum nigrum*, *2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), 3110 Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia), 4030 European dry heaths** and **5130 *Juniperus communis* formations on heaths or calcareous grasslands.** The rare Annex II liverwort species, *Petalophyllum ralfsii* (Petalwort), was previously recorded at Derrybeg but was not recorded during the SDM. The Annex I bird species *Pyrrhocorax pyrrhocorax* (Chough) and Annex V species *Rana temporaria* (Common Frog) were both noted during the SDM.

The main land-use for the site is for amenity. There is a golf course located in the ***21A0 Machairs** habitat in the north of the site, and a hotel to the south. A local road cuts through the site and provides access to the two piers in the north and there are car parks present to facilitate visitors. Derrybeg is of potential conservation interest, not only due to its sand dune system but also due to the presence of intact transitions to saltmarsh, coastal grassland and peatland, with shallow soil over rock in some areas within the site.

2 CONSERVATION ASSESSMENTS

2.1 Overview

Derrybeg was surveyed from the 6th to 7th of September 2011. Of the seven Annex I sand dune habitats recorded on site during the baseline survey, six were recorded in 2011. The habitats found

at Derrybeg in 2011 and the results of the conservation assessments are presented in Table 1. **2170 Dunes with creeping willow** was not recorded during the SDM. The conservation status of **1210 Annual vegetation of drift lines**, though present in 2011, was not assessed as it was below the minimum monitoring area. Of the remaining habitats, **2110 Embryonic shifting dunes** was the only habitat assessed as Favourable. **2120 Marram dunes (white dunes), *2130 Fixed dunes (grey dunes), 2190 Humid dune slacks** and ***21A0 Machairs** were all assessed as having Unfavourable-Inadequate conservation status.

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

Habitat	Area	Structure & Functions	Future Prospects	Overall result
2110 Embryonic shifting dune	Favourable (Stable)	Favourable (Stable)	Favourable (Stable)	Favourable (Stable)
2120 Marram dunes (white dunes)	Favourable (Stable)	Unfavourable-Inadequate (Improving)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Improving)
*2130 Fixed dunes (grey dunes)	Favourable (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)
2190 Humid dune slacks	Favourable (Stable)	Unfavourable-Inadequate (Deteriorating)	Unfavourable-Inadequate (Deteriorating)	Unfavourable-Inadequate (Deteriorating)
*21A0 Machairs	Unfavourable-Inadequate (Deteriorating)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (deteriorating)

2.1.1 Area

The areas of each Annex I sand dune habitat at Derrybeg according to the baseline maps, the revised baseline maps and the Sand Dunes Monitoring Project are presented in Table 2. The baseline area of ***2130 Fixed dunes (grey dunes)** was revised after the site was visited in 2011 to account for a change in the interpretation of part of the site previously mapped as ***21A0 Machairs**. The vegetation and morphology were more similar to that of ***2130 Fixed dunes (grey dunes)**, so the area was reclassified as that habitat. A hollow which had previously been mapped as "unidentified other" habitat was included as ***21A0 Machairs** in the revised baseline maps. The presence of a bull during the CMP prevented detailed mapping of **2190 Humid dune slacks** from being carried out. The **2190 Humid dunes slacks** were mapped more accurately during the SDM and resulted in a change in the baseline area of this habitat. The area which had been mapped as **2170 Dunes with creeping willow** during the CMP was not considered to correspond to the Annex I habitat definition because of its association with a rocky outcrop, the absence of any likely former dune slack nearby and the vegetation which was dominated by *Rosa spinosissima*, and was therefore removed as a habitat on the site. A golf course is located on the machair plain, and this was excluded from the site during the CMP. It is unfenced and grazed by sheep. In 2011, the vegetation appeared to be very similar to that of the adjacent ***21A0 Machairs**. This area was included in a large polygon (30.60 ha) consisting of built land and ***21A0 Machairs** and labelled "Unsurveyed". It was not included in the SDM area presented in Table 2. In future, consideration should be given to including it within the site as the management does not appear to have degraded the habitat to the point where it is no longer ***21A0 Machairs**. The total area of Annex I sand dune habitats at Derrybeg was slightly smaller in 2011 than it had been during the CMP, due

to a small amount of natural erosion and succession, particularly for those habitats close to the shore, and also due to human interference.

Table 2. Areas of Annex I dune habitats originally mapped at Derrybeg 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	0.05	0.05	0.02
2110 Embryonic shifting dunes	1.45	1.45	0.69
2120 Marram dunes (white dunes)	5.03	5.03	3.96
*2130 Fixed dunes (grey dunes)	5.37	30.05	30.80
2170 Dunes with creeping willow	0.96	0.00	0.00
2190 Humid dune slacks	0.30	0.19	0.19
*21A0 Machairs	120.83	96.64	93.80
Total	133.99	133.41	129.46

2.1.2 Structure and Functions

Structure and Functions were assessed for five of the Annex I sand dune habitats mapped at Derrybeg. 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. **1210 Annual vegetation of drift lines** was below the minimum monitoring area and no Structure and Functions assessment was carried out. All of the criteria passed in the assessment for **2110 Embryonic shifting dunes.** A single criterion failed for both **2120 Marram dunes (white dunes)** and **2190 Humid dune slacks** and two criteria failed for ***2130 Fixed dunes (grey dunes)** and ***21A0 Machairs**.

Table 3. Annex I sand dune habitats at Derrybeg 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	0
2120 Marram dunes (white dunes)	8	7	1
*2130 Fixed dunes (grey dunes)	8	11	2
2190 Humid dune slacks	4	11	1
*21A0 Machairs	12	10	2

2.1.3 Future Prospects

Impacts and activities recorded at Derrybeg are presented in Table 4. Impact codes are assigned according to Ssymank (2010). **1210 Annual vegetation of drift lines** was negatively affected by the presence of a pier and rock armour. The percentage of the habitat affected is unknown as there has been a 60% loss since the CMP but it is not clear whether the remaining portion of the habitat will be affected by the developments. **2110 Embryonic shifting dunes** only had neutral impacts recorded. No positive impacts were recorded for any habitat at Derrybeg. Walking and rock armour were common to all habitats with walking having a neutral effect on all habitats. The majority of the negative impacts for Derrybeg were associated with the site's main land-use – amenity; these impacts included trampling, piers, car parks and off-road driving. Sheep grazing

was a negative impact for ***21A0 Machairs**, while ***2130 Fixed dunes (grey dunes)** and **2190 Humid dune slacks** suffered from undergrazing.

Table 4. Impacts recorded in Annex I sand dune habitats at Derrybeg 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	D03.01.02	Pier	High	Negative	Unknown	Outside
1210	J02.12.01	Rock armour	High	Negative	Unknown	Outside
2110	G01.02	Walking	Low	Neutral	5	Inside
2110	J02.12.01	Rock armour	-	Neutral	0	Outside
2110	K01.01	Erosion	High	Neutral	40	Inside
2120	D01.03	Car parks	Medium	Neutral	1	Outside
2120	D03.01.02	Pier	Medium	Negative	5	Outside
2120	G01.02	Walking	Low	Neutral	5	Inside
2120	G05.01	Trampling	Medium	Negative	1	Inside
2120	J02.12.01	Rock armour	Medium	Negative	5	Outside
2120	K01.01	Erosion	High	Neutral	10	Inside
*2130	A04.03	Undergrazing	Medium	Negative	20	Inside
*2130	D01.03	Car parks	Low	Neutral	1	Outside
*2130	G01.03.02	Off-road driving	High	Negative	1	Inside
*2130	G05.01	Trampling	High	Negative	1	Inside
*2130	I02	*Pteridium aquilinum* and *Rosa* sp.	Low	Negative	10	Inside
*2130	J02.12.01	Rock armour	-	Neutral	0	Outside
*2130	K01.01	Erosion	Low	Neutral	1	Inside
2190	A04.03	Undergrazing	Low	Negative	75	Inside
2190	G01.02	Walking	Medium	Neutral	1	Inside
2190	G01.03.02	Off-road driving	High	Negative	1	Inside
2190	J02.12.01	Rock armour	-	Neutral	0	Outside
*21A0	A04.02.02	Non intensive sheep grazing	Medium	Negative	100	Inside
*21A0	A08	Fertiliser	Medium	Negative	5	Inside
*21A0	G01.02	Walking	Medium	Neutral	1	Inside
*21A0	G01.03.02	Off-road driving	High	Negative	5	Inside
*21A0	G02.01	Golf course	Low	Negative	10	Outside
*21A0	H05.01	Dumping	High	Negative	1	Inside
*21A0	J02.12.01	Rock armour	-	Neutral	0	Outside
*21A0	K01.01	Erosion	Medium	Neutral	1	Inside

2.2 Annex I habitat assessments

The conservation status of the Annex I habitats at Derrybeg 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

No conservation assessment was carried out for **1210 Annual vegetation of drift lines** because it was below the minimum monitoring area. The area of **1210 Annual vegetation of drift lines** had decreased from 0.05 ha during the CMP to 0.02 ha during the SDM, and this loss of habitat occurred in an area where pier development and rock armour installation has taken place. If **1210 Annual vegetation of drift lines** had been assessed, Area would have been Unfavourable-Bad (deteriorating) in 2011. Structure and Functions were not assessed in the remaining area of this habitat. Both the pier and rock armour were recorded as negative impacts.

2.2.2 2110 Embryonic shifting dunes

2110 Embryonic shifting dunes are found in the southwest of Derrybeg, associated with the ***2130 Fixed dunes (grey dunes)** part of the system rather than the ***21A0 Machairs**.

Area

The area of **2110 Embryonic shifting dunes** decreased from 1.45 ha during the CMP to 0.69 ha during the SDM. The loss in area is the result of erosion and succession to **2120 Marram dunes (white dunes)**, and does not appear to be associated with any human activity. 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 at Derrybeg. No negative impacts were recorded. During the CMP, Future Prospects were assessed as Favourable. Future Prospects were assessed as Favourable (stable) during the CMP.

Conservation assessment

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

2.2.3 2120 Marram dunes (white dunes)

The largest part of the **2120 Marram dunes (white dunes)** is found in the southwest of Derrybeg, between **2110 Embryonic shifting dunes** and ***2130 Fixed dunes (grey dunes)**, but there is a section of the habitat west of the ***21A0 Machairs** as well.

Area

The area of **2120 Marram dunes (white dunes)** at Derrybeg decreased from 5.03 ha during the CMP to 3.96 ha during the SDM. This is not considered to be related to human activities. Although there has been some succession from **2110 Embryonic shifting dunes,** more of the habitat has eroded than has developed since the baseline survey. There has also been some

succession to ***2130 Fixed dunes (grey dunes)**. During the CMP, Area was assessed as Favourable. Area was assessed a Favourable (stable) during the SDM.

Structure and Functions

One criterion failed in the Structure and Functions assessment. The northern part of the habitat is located in a cove which has been developed and has a pier, parking area, access track and rock armour. Although a structure was present before 1995, much of the development occurred between 2000 and 2005, according to aerial photographs. The development alters the wave action within the cove and increases amenity use on the beach. During the CMP, Structure and Functions were assessed as Unfavourable-Bad because parts of the habitat contained an excess of grasses in poor health and one stop contained too great a cover of *Cirsium* species. Under the current methodology, the development of the northern cove would also have been recorded as affecting the Structure and Functions of the habitat. During the SDM, no flowering was recorded at one of the stops. This stop was recorded in an area with very little bare soil which appeared to be becoming naturally stabilised, which would explain why Marram was no longer thriving there. *Cirsium* species were not recorded from monitoring stops during the SDM. Structure and Functions were assessed as Unfavourable-Inadequate (improving) during the SDM.

Future Prospects

Walking and erosion were recorded as neutral impacts in **2120 Marram dunes (white dunes)**. Trampled paths run through the habitat, and trampling was recorded as a medium-intensity negative impact affecting up to 1% of the habitat. The presence of the pier and rock armour in the northern section of the site will continue to affect the habitat into the future. Potential outcomes include over-stabilisation of the foredune zone and scouring at the point where the hard defences meet the soft dune substrate (ECOPRO, 1996). During the CMP, Future Prospects were assessed as Unfavourable-Inadequate because of the effects of recreation. Negative impacts listed during the CMP included motorised vehicles, trampling and coastal protection works. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Conservation assessment

Two of the parameters were assessed as Unfavourable-Inadequate during the SDM while one was assessed as Favourable. During the CMP, one parameter was assessed as Favourable, one as Unfavourable-Inadequate and one as Unfavourable-Bad, and this led to an Unfavourable-Bad assessment for the habitat. During the SDM, the conservation status of **2120 Marram dunes (white dunes)** was assessed as Unfavourable-Inadequate (improving).

*2.2.4 *2130 Fixed dunes (grey dunes)*

The boundary between the ***21A0 Machairs** and ***2130 Fixed dunes (grey dunes)** was altered to account for the presence of high dune ridges in the south of the site, which was formerly mapped as ***21A0 Machairs**. The mapping of ***2130 Fixed dunes (grey dunes)** during the SDM includes transitional area where the habitat grades into grassland and peatland.

Area

Area of ***2130 Fixed dunes (grey dunes)** increased from 30.05 ha during the baseline survey to 30.80 ha during the SDM. This is primarily due to accretion and succession, although the northern part of the ***2130 Fixed dunes (grey dunes)** has undergone considerable erosion. There was no indication of habitat loss due to human interference. During the CMP, natural erosion and damage due to disturbance were considered to have resulted in a loss of habitat, and Area was assessed as Unfavourable-Inadequate. Neither of these would result in an unfavourable assessment for Area under the current methodology, and Area was assessed as Favourable (stable) during the SDM.

Structure and Functions

Two of the criteria failed in the Structure and Functions assessment. The criterion assessing the presence of negative indicator species failed because of high covers of *Rosa spinosissima* in two stops. The criterion assessing damage due to disturbance also failed, and this is because of the numerous trampled tracks through the habitat. Structure and Functions were assessed as Favourable during the CMP, but the tracks and paths which were noted in the Area assessment would have been considered here under the current methodology and would have resulted in an Unfavourable-Inadequate Structure and Functions assessment. Structure and Functions were assessed as Unfavourable-Inadequate (stable) during the SDM.

Future Prospects

Off-road driving, trampling, problematic native species and undergrazing were noted as negative impacts in the ***2130 Fixed dunes (grey dunes)** at Derrybeg. Erosion was noted as a neutral impact. During the CMP, undergrazing, tracks, walking/horse riding and trampling were recorded as negative impacts and Future Prospects were assessed as Unfavourable-Inadequate because of undergrazing, unofficial tracks, walking and trampling. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Conservation assessment

Area was assessed as Favourable while Structure and Functions and Future Prospects were assessed as Unfavourable-Inadequate. If the current methodology had been applied during the CMP, the assessment of each of the parameters would have been the same during the CMP. The conservation status of ***2130 Fixed dunes (grey dunes)** at Derrybeg was assessed as Unfavourable-Inadequate (stable).

2.2.5 2190 Humid dune slacks

Four small **2190 Humid dune slacks** were mapped in the southern end of the site within the ***2130 Fixed dunes (grey dunes)** habitat.

Area

The area of **2190 Humid dune slacks** remained the same at 0.19 ha between the CMP and SDM. Area was assessed as Favourable during the CMP. There was no sign of any anthropogenic loss of habitat in 2011, and Area was assessed as Favourable (stable) during the SDM.

Structure and Functions

The criterion assessing the presence of positive indicator species failed in the Structure and Functions assessment. Too few indicator species were frequent throughout the habitat and one stop only contained two indicator species. Several of the slacks appear rank and have a tall, dense sward. All of the other criteria were assessed as Favourable. During the CMP, Structure and Functions were assessed as Favourable on the basis of expert judgement. Structure and Functions were assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Future Prospects

Walking and rock armour was noted as neutral impacts in 2011. Off-road driving was noted as a negative impact affecting 1% of the habitat, while undergrazing affects 75%. During the CMP, Future Prospects were assessed as Favourable on the basis of expert judgement. Future prospects were assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Conservation assessment

Area was assessed as Favourable and Structure and Functions and Future Prospects were assessed as Unfavourable-Inadequate during the SDM. All of the parameters were assessed as Favourable during the CMP. The conservation status of **2190 Humid dune slacks** was assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

*2.2.6 *21A0 Machairs*

Derrybeg is primarily a machair system, and the habitat is managed in a traditional manner as pasture. The only grazers on the site during the survey in 2011 were sheep. Sheep grazing is considered to be less appropriate than cattle grazing in ***21A0 Machairs** because it produces a very tight sward and can impede plants from flowering and setting seed. In the north, part of the habitat is excluded from the site and from the SAC as it is managed as a golf course. Management does not appear to be intense, and sheep wander freely into the course. The vegetation is slightly lusher inside the golf course, which suggests that it may be fertilised. Grazing is most intense in the unenclosed northern part of the habitat. South of the main access road, the habitat is in better condition, although the sward height is still shorter than optimal. The southern part of the site was identified as being of greater conservation interest during the baseline survey.

Area

The area of ***21A0 Machairs** has declined from 96.64 ha during the CMP to 93.80 ha during the SDM. This loss is primarily due to the removal of all vegetation and top-soil from a field of 2.83 ha in an area which was previously classified as ***21A0 Machairs**. A digger and tractors were present during the site visit in 2011, and the field had been converted to bare sand (Figure 1). This is an anthropogenic loss of 2.9% of the habitat over the six years since designation.

Figure 1. Loss of ***21A0 Machairs** habitat from within the SAC at Derrybeg viewed on 7th September 2011.

During the CMP, Area was assessed as Unfavourable-Inadequate because of an extension of the area managed as part of the golf course and the development of holiday homes and access roads into the ***21A0 Machairs**. Because the golf course management does not involve reseeding or remove the substrate, extension of the course would have been considered under the Structure and Functions assessment rather than the Area assessment under the current methodology. Aerial photographs indicate that 0.59ha had been lost by the time of the CMP survey due to development, and this has not been restored. In total, 3.5 % of the habitat at Derrybeg has been lost since the Habitats Directive came into force. Area was assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Structure and Functions

Two criteria failed in the Structure and Functions assessment. The average sward height was too low at 4.06 cm and there was considerable damage to the habitat as the result of off-road driving. During the CMP, Structure and Functions were assessed as Unfavourable-Inadequate because of the tight sward and the presence of negative indicator species. The extension of the golf course does not appear to have significantly altered the Structure and Functions of the habitat. Damage to the habitat was not recorded as part of the Structure and Functions assessment during the baseline survey. Structure and Functions were assessed as Unfavourable-Inadequate (stable) during the SDM.

Future Prospects

Walking, rock armour and erosion were recorded as neutral impacts at Derrybeg, while sheep grazing, fertilisation, off-road driving and dumping were negative impacts affecting the habitat. The golf course is recorded as a negative impact with an external source. It is likely that some of the driving in the habitat is associated with access to the golf course and as the golf course appears to be fertilised, run-off to the adjacent ***21A0 Machairs** habitat is likely. There is no indication that the loss of habitat since implementation of the Habitat Directive will be remediated. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate due overgrazing, trampling and the activities of the golf course. Other negative impacts listed included fertiliser application,

undergrazing, fencing, stock feeding, the pier and car park, housing, dumping, paths and tracks, golf course, sports pitch, walking/horse riding, driving on the habitat and trampling. Undergrazing was probably recorded within the area reclassified as ***2130 Fixed dunes (grey dunes)** in 2011. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Conservation assessment

All three parameters were assessed as Unfavourable-Inadequate during both the CMP and SDM. The loss of ***21A0 Machairs** noted in the CMP has not been addressed, and further loss has occurred in the interim, so the Area trend is deteriorating. The conservation status of ***21A0 Machairs** at Derrybeg was assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

3 Discussion

3.1 Potential conservation value

Previous reports have commented on the reduced conservation value of the ***21A0 Machairs** habitat in Derrybeg, particularly in the north of the site. The reasons for its reduced interest are given as human pressures (Bassett, 1983) and overgrazing by sheep (Gaynor & Browne, 1999). The habitat was grazed to a tight sward in 2011, but positive indicator species were plentiful, with a minimum of six present in every monitoring stop. Although it is likely that some fertiliser application occurs in the golf course, it is not managed intensively. The ***21A0 Machairs** at Derrybeg exists as part of a system of considerable diversity. The combination of wet and dry habitats, intact habitat transitions to other coastal, marine and terrestrial habitats and the extent of the machair plain at this site suggest that given the right management, it could become a site of considerable conservation interest. The site has the potential to provide important resources for plant, invertebrate and bird species. Records of notable species such as *Petalophyllum ralfsii* and *Pyrrhocorax pyrrhocorax* from Derrybeg illustrate the site's conservation potential.

3.2 Grazing

Grazing pressure is most intense in the unfenced northern part of the ***21A0 Machairs** habitat. This area is grazed by sheep and is closely cropped. To the south of the access road serving the pier, grazing is slightly less intense. 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 tends to become less diverse over time if herbaceous species fail to set seed. The ***2130 Fixed dunes (grey dunes)** and **2190 Humid dune slacks** in the south of the site are lightly grazed by cattle, and, in parts, a slightly increased intensity of grazing would be of benefit to the habitats.

3.3 Amenity use

The local area is well-populated and visitors are attracted to Derrybeg as a result of the beaches, hotel and golf course. Because the site is largely unenclosed, visitors have access to large portions of the site both on foot and by car. Paths and vehicle tracks run through the ***2130 Fixed dunes (grey dunes)** and ***21A0 Machairs**. 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. In common with many coastal sites in Ireland, parts of the machair plain are used for sports at Derrybeg. A third sports pitch was in the process of being developed when the site was surveyed in 2011. This has resulted in loss of area of a priority Annex I habitat within an SAC.

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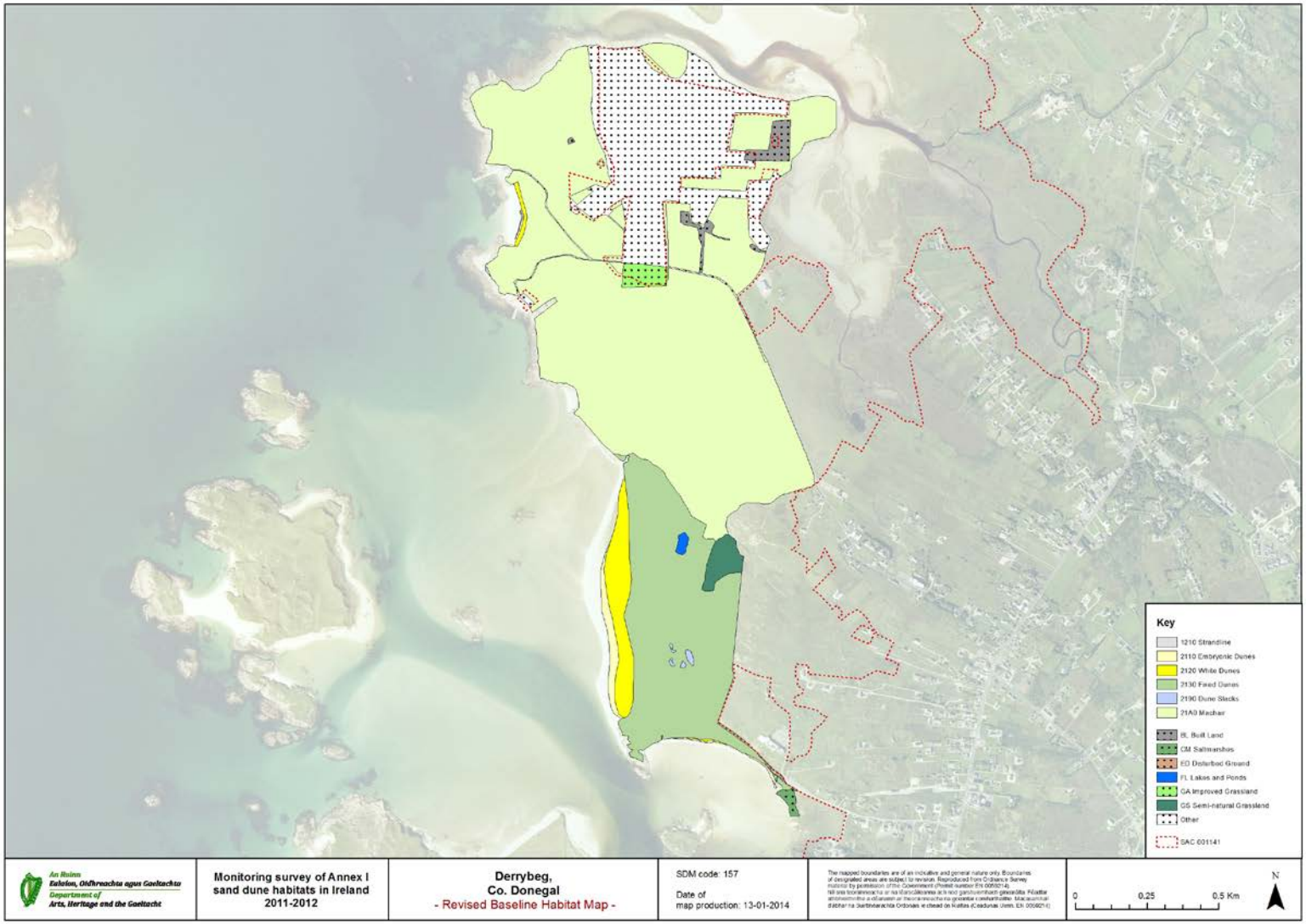
Key
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2110 Embryonic Dunes
2120 White Dunes
2130 Fixed Dunes
2190 Dune Slacks
21A0 Machair
BL Built Land
GM Saltmarshes
ED Disturbed Ground
FL Lakes and Ponds
GA Improved Grassland
GS Semi-natural Grassland
Other
SAC 001141
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Monitoring survey of Annex I sand dune habitats in Ireland 2011-2012
Derrybeg, Co. Donegal
- Revised Baseline Habitat Map -
SDM code: 157
Date of map production: 13-01-2014
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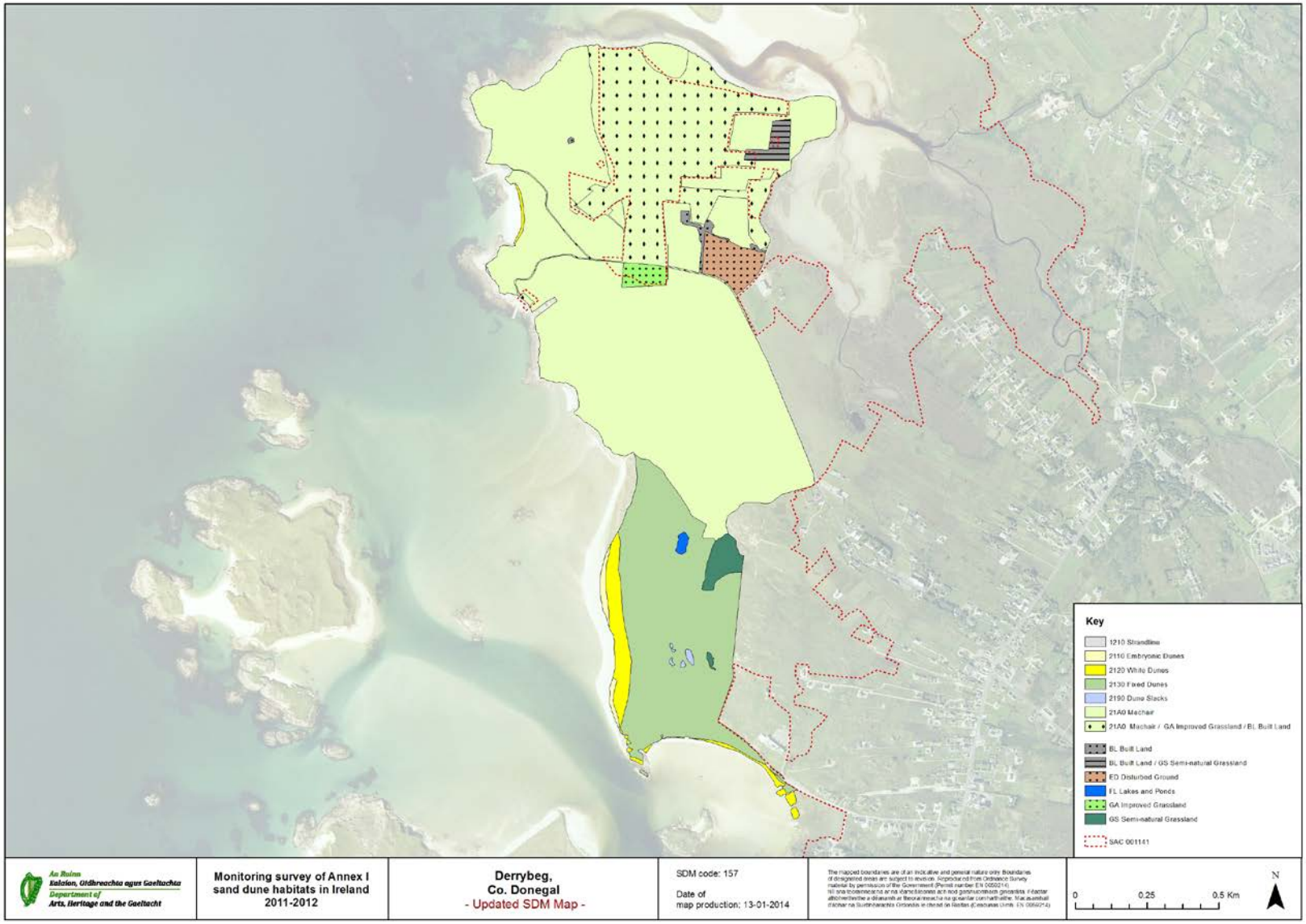
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