

**North Inishowen Coast SAC (site code 2012)  
Conservation objectives supporting document  
-coastal habitats**

**NPWS**

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

**Please note that this document should be read in conjunction with the following report: NPWS (2014). Conservation Objectives: North Inishowen Coast SAC 002012. 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.

North Inishowen Coast SAC is a large site that stretches from Crummies Bay in the west up to Malin Head and back down to Inishowen Head to the East. It includes a variety of coastal habitats including high rocky cliffs, offshore islands, sand dunes, salt marsh, a large intertidal bay and rocky, shingle and sand beaches. Cliff and outcropping rock is frequent throughout the site with quartzite being the predominant rock type, although small areas with schist and granite bedrock also occur. The coastline close to Malin Head provides some of the best examples of late-glacial marine strandlines in Ireland thus is of great interest from a geomorphological perspective.

North Inishowen Coast SAC (site code: 2012) is designated for a range of coastal habitats including vegetated shingle, sand dunes, machair and sea cliffs. The following four coastal habitats are included in the qualifying interests for the site (\* denotes a priority habitat):

- Perennial vegetation of stony banks (1220)
- Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)\*
- Machairs (21A0)\*
- Vegetated sea cliffs of the Atlantic and Baltic coasts (1230)

The first habitat represents vegetated shingle, the next two are associated with sand dune systems, and the last is sea cliffs. All four of these habitats may be found in close association with each other. Other coastal habitats which are also Annex I are present within the site but are not listed as qualifying interests, these include: Annual vegetation of drift lines (1210), Embryonic shifting dunes (2120), Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2110), Decalcified dunes with *Empetrum nigrum* (2140), Dunes with *Salix repens* ssp *argentea* (*Salicion arenariae*) (2170), Humid dune slacks (2190), Atlantic salt meadows (*Glauco-Puccinetalia maritima*) (1330), Mediterranean salt meadows (*Juncetalia maritima*) (1410). The distribution of known shingle sites is presented in Appendix I, the distribution of sand dune habitats is presented in Appendix II and sea cliffs in Appendix III.

This backing document sets out the conservation objectives for the four coastal habitats listed above in North Inishowen Coast 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** is 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 Lenankeel, Doagh Isle, Lag and White Strand sub-sites by the Coastal Monitoring Project (Ryle *et al.*, 2009).

The NSBS visited the following 18 sub-sites within North Inishowen Coast SAC:

1. Tramone Bay
2. Slievebane
3. Bulbin
4. Portmore
5. Bulbinbeg
6. Esky Bay
7. Pebble Strand
8. Ineuran Bay
9. Whitestrand Bay
10. Whitestrand Bay – Culoort
11. Back Strand
12. Doaghmore point
13. Lagacurry, Doagh Strand, Bincree, Binderg
14. Pollan Bay
15. Tullagh Bay and Tullagh Point
16. Rockstown Harbour
17. Dunaff Bay
18. Lehan Bay

Profiles and transects were recorded from each shingle beach and each site was assigned a 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. At North Inishowen Coast, three sub-sites were rated 'high interest': Whitestrand Bay – Culoort, Tullagh Bay and Tullagh Point, and Rockstown Harbour. Five sub-sites were rated of 'medium interest': Pebble Strand; Whitestrand Bay; Doaghmore point; Lagacurry, Doagh Strand, Bincree, Binderg; Pollan Bay. The habitat was not mapped but the vegetation was recorded, as were the human impacts

and alterations at the site, which are useful tools for assessing the Structure & Functions of the site.

The Whitstrand Bay–Culoort sub-site consists of a multi-ridged raised beach and was rated of high interest by the NSBS owing to the huge deposit of shingle with excellent botanical and geomorphological characteristics. The rare oyster plant (*Mertensia maritima*) was recorded at this site. Lichens are present indicating a degree of stability. Associated habitats include intertidal shingle, rocky shore and cliff. This site has been damaged however, by dumping and extraction (Moore & Wilson, 1999).

The sub-site at Tullagh Bay and Tullagh Point was also rated of high interest by the NSBS. This sub-site consists of a series of bays containing huge storm deposits and raised beaches that are stabilised in places. The north and west facing beaches in Tullagh Point are particularly noteworthy and support populations of the rare oyster plant (*Mertensia maritima*). Lichens are present indicating some stability of the shingle habitat. Associated habitats include intertidal shingle and rocky shore. Again, negative impacts to the site due to dumping and extraction were recorded here (Moore & Wilson, 1999).

Rockstown Harbour sub-site consists of an extensive raised beach system that is heavily cusped and supports excellent vegetation. Large scale extraction, however, negatively impacts on the site. The site includes Carrickatemple, an outcrop of rocks surrounded by shingle which is accessible at low tide. The tombola of shingle between Rockstown Harbour and Carrickatemple and the unique flora of the raised beach make this site of 'high interest'. Large areas of undisturbed beach with heavy lichen growth are also present at this site. Associated habitats include intertidal shingle (Moore & Wilson, 1999).

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

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

1. Lenankeel
2. Tullagh
3. Doagh Isle
4. Lag
5. White Strand

6. Culdaff
7. Crummies Bay

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 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 Crummies Bay) 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 Crummies Bay are included in Appendix X.

The Lenankeel sub-site and beach is located in Lenan Bay, south of Lenan Head. The beach is backed by a steep mobile dune ridge which grades into fixed dune and machair landward. Both the fixed dune and machair are fenced into fields. A caravan park was situated in this area in the past but has since been removed. The coastal habitats recorded by the CMP at this sub-site include shifting dunes along the shoreline with *Ammophila arenaria*, Fixed dunes and Machair as well as Perennial vegetation of stony banks and Annual vegetation of driftlines (Ryle *et al.*, 2009).

The Tullagh sub-site is located on the northwest shore of the Inishowen peninsula, approximately 2.5km west of Ballyliffen. The dune system at this sub-site has greatly reduced in extent and condition over the years. The coastal habitats recorded at the Tullagh sub-site by the CMP include Embryonic shifting dunes, Shifting dunes along the shoreline with *Ammophila arenaria*, Fixed coastal dunes with herbaceous vegetation and Machair (Ryle *et al.*, 2009).

The Doagh Isle sub-site is situated along the northwestern edge of the Inishowen Peninsula, just south of Malin Head. The site contains the most extensive areas of machair and fixed dunes that occur within the SAC, however part of the fixed dune has been modified by Ballyliffen golf course. The golf course was established in 1947 and occupies 146ha of fixed dunes which have been excluded from the SAC (Gaynor & Browne, 1999). Machair occurs at the neck of Doagh Isle, on the southern side of the fixed dunes; it is bounded by a channel on the landward side and grades in to wet semi-improved fields. All the machair is strip-fenced and agriculturally improved to some extent. The coastal habitats that occur in association with fixed dune and machair at this sub-site include: annual vegetation of drift lines, embryonic

shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* and humid dune slacks. Perennial vegetation of stony banks was also recorded at this sub-site by the CMP (Ryle *et al.*, 2009).

The Lag sub-site is located at the northern tip of the Inishowen Peninsula, approximately 8km south of Malin Head and 5km north of Malin village. Lag is one of the larger sand dune sites on the Inishowen peninsula and contains a considerable expanse of fixed dunes. The extensive dunes are frequently quite tall, rising in places to at least 25m above the beach level, while some of the dunes in the northernmost part of the site have formed over the underlying low rocky hills and rise steeply away from the seaward edge of the system. Coastal habitats in addition to fixed dunes that were recorded at the Lag sub-site include: annual vegetation of driftlines, perennial vegetation of stony banks, embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria*, dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) and humid dune slacks (Ryle *et al.*, 2009)

The White Strand sub-site supports a small area of fixed dunes and machair, but both habitats have been somewhat altered by agricultural practices and development. Other habitats recorded at this sub-site along with machair and fixed dune include: embryonic dunes, perennial vegetation of stony banks and annual strandline vegetation.

The Culdaff sub-site is in Culdaff Bay, adjacent to the town of Culdaff on the northeast side of the Inishowen peninsula. The dunes extend along approximately 1km of coastline and lie between the headlands of Carrickkeeragh to the North and Dunmore Head to the south. The sandhills are low, rising to no more than approximately 8m above the level of adjacent fine grained sandy beach. Within this subsite, scrub and dense stands of bracken (*Pteridium aquilinum*) are a feature of the dune grassland, while a small saltmarsh lies to the south of the dunes, adjacent to the Culdaff River channel. Coastal habitats along with fixed dunes that were recorded at his sub-site include: embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* and humid dune slacks.

The Crummies Bay (Portbane) sandhills on the eastern shore of Lough Swilly and west side of the Inishowen Peninsula, are approximately 10km from Buncrana. The sandhills are small, extending over approximately 0.5km of northwest facing coastline, and comprise less than 15ha of sand dune habitats. The sandhills are for the most part ungrazed and as a result the dune grassland is quite rank in nature. The sandhills are low without high dune ridges. The sand dune habitats recorded at Crummies Bay include Annual vegetation of driftlines, Embryonic shifting dunes, Shifting dunes along the shoreline with *Ammophila arenaria*, Fixed coastal dunes with herbaceous vegetation and Decalcified fixed dunes with *Empetrum nigrum* (Ryle *et al.*, 2009; Delaney *et al.*, 2013).

The conservation objectives for the sand dune habitats (including machair) in North Inishowen Coast 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 North Inishowen Coast SAC.

The targets set for **vegetated sea cliffs** is based on the findings of the Irish Sea Cliff Survey (ISCS) (Barron *et al.*, 2011) and this document should be read in conjunction with that report.

The Irish Sea Cliff Survey (ISCS) surveyed 11 sub-sites within North Inishowen Coast SAC:

1. Glengad
2. Altnadarrow
3. Binbane
4. Carrickabraghy
5. Binnion
6. Dunaff
7. Lenan
8. Lederg
9. Mossy Glen
10. Tirmacrorgh
11. Stookannillar and Five Fingers

Two of these sub-sites, Dunaff, and Stookanillar and Five Fingers, were surveyed in the field. A further undocumented cliff sub-site occurs at Dunree.

The best examples of sea cliffs in this SAC site are found in the west of the site (Dunree to Leenan Head and Dunaff Head) and in an area to the north-west of Glengad Head. Cliffs are often less than 50m though they reach over 200m at Dunaff and to the north-west of Glengad Head. The dominant rock type is quartzite which is particularly hard. The vegetation cover of the cliffs is variable and is dependent on factors such as underlying geology, aspect and the degree of exposure to winds and sea-spray. The cliffs contain a number of rare plant species, notably scots lovage (*Ligusticum scoticum*), a legally protected species. Two other scarce species recorded within the North Inishowen Coast SAC are moss campion (*Silene acaulis*) and purple saxifrage (*Saxifraga oppositifolia*), and are listed in the Red Data Book. Ivy broomrape (*Orobanche hederæ*), a locally rare species was recorded from the sea cliffs north of Leenan Bay. Roseroot (*Sedum rosea*) which is largely restricted to high mountain cliffs and sea cliffs in the west and north of the country is also frequent throughout the site. In many parts of the site, the sea cliffs support dry heath and grassland vegetation which occurs as a mosaic with the rocky cliff areas. The sea cliff habitat throughout the site provides habitat for a typical diversity of coastal bird species, notably Peregrine and Chough, Annex I Birds

Directive species that breed within the site. Both of these species are associated with the rocky sea cliffs, with the Choughs utilising the heath and sandy habitats for feeding.

## **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 North Inishowen Coast 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 current extent of this habitat in North Inishowen Coast is unknown. The National Shingle Beach Survey recorded vegetated shingle ridge from 18 sub-sites: Tramone Bay; Slievebane; Bulbin; Portmore; Bulbinbeg; Esky Bay; Pebble Strand; Ineuran Bay; Whitestrand Bay; Whitestrand Bay – Culoort; Back Strand; Doaghmore Point; Lagacurry, Doagh Strand, Binree, Binderg; Pollan Bay; Tullagh Bay and Tullagh Point; Rockstown Harbour; Dunaff Bay; Lehan Bay (Moore & Wilson, 1999).

Vegetated shingle was also recorded and mapped at Culdaff, Lenankeel, Doagh Isle, Lag and Whitestrand by Ryle *et al.* (2009). The total areas of vegetated shingle within these sub-sites as estimated by Ryle *et al.* (2009) are presented in the second column of the following table. These figures were subsequently checked and adjusted to take into account some overlapping polygons and mapping errors. The adjusted figures are presented in the final column.

	<b>Total area (ha) of habitat from CMP</b>	<b>Total area (ha) of habitat within SAC boundary</b>
Culdaff	0.015	0.015
Doagh Isle	1.206	1.206
Lag	0.091	0.091
Lenankeel	0.009	0.009
White Strand	2.14	2.106
<b>Total</b>	<b>3.461</b>	<b>3.427</b>

The general target for this attribute is that the area should be stable or increasing. Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is always assessed subject to natural processes, including erosion and succession.

### **3.3 Range**

#### **3.3.1 Habitat distribution**

Donegal contains large areas of shingle beaches and is noted as a County for its raised beaches. The best shingle formations in the county are found on the Inishowen peninsula and on Doagh Isle (Moore & Wilson, 1999). The distribution of known shingle sites is presented in Appendix I.

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.

The target is to maintain, or where necessary restore, 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. Transitions to intertidal shingle, rocky shore, shingle based grassland, sand dunes, machair and cliffs occur at this site (Moore & Wilson, 1999).

The presence of lichens indicates long term stability of the shingle structure. Lichens were recorded at Whitestrand Bay-Culoort, Doaghmore Point, Tullagh Bay and Tullagh Point and Rockstown Harbour by the NSBS. Most of these sites were rated of high interest with the exception of Doaghmore Point, which was rated of medium interest (Moore & Wilson, 1999).

The target is to maintain the shingle habitat, as well as transitional zones, including those to terrestrial communities.

#### **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 at North Inishowen Coast is known to support species at typical flora for this habitat.

Although the vegetation of the shingle areas is usually quite sparse, plant species such as sea sandwort (*Honckenya peploides*), sea mayweed (*Tripleurospermum maritima*), cleavers (*Galium aparine*), curled dock (*Rumex crispus*), sea campion (*Silene uniflora*) are locally frequent. The legally protected, Irish Red Data Book plant species, oyster plant (*Mertensia maritima*) has been recorded growing on shingle substrate at three locations: Rockstown Harbour, Tullagh Point and Culoort. Plants that grow in this habitat are threatened both by natural erosional processes and the extraction of shingle for building and agricultural purposes (NPWS internal files).

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*).

The negative indicator species ragwort (*Senecio jacobaea*) and the non-native species montbretia (*Crocsmia x crocosmiiflora*) was recorded in the vegetated shingle habitat at White Strand by the CMP (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 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) \***

Eight dune habitats were recorded by Ryle *et al.* (2009) and Delaney *et al.* (2013) but only the two habitats indicated in bold above are listed as Qualifying Interests for North Inishowen Coast SAC.

Other Annex I habitats (Annual vegetation of driftlines, Embryonic shifting dunes, Shifting dunes along the shoreline with *Ammophila arenaria*, Decalcified dunes with *Empetrum nigrum* and Humid dune slacks) also occur within the site (Ryle *et al.*, 2009; Delaney *et al.*, 2013). All the coastal habitats at this SAC site occur in close association to each other and form a dynamic coastal 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.

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 (Ryle *et al.*, 2009). Fixed dunes are widely distributed throughout this SAC site, occurring at the Isle of Doagh, Dunree, Tremone Bay, Culdaff and at Lagg. The area of fixed dune at the Isle of Doagh is by far the most extensive, with the other systems being largely confined to relatively small sheltered bays, not greater than 1.5km in width. The most interesting dune area within the site is the extensive area at Doagh Isle which contains numerous areas of outcropping rock and has an associated machair plain. Many of the fixed dune areas have been damaged by a variety of land-use practices in the recent past (Natura 2000). Fixed dune habitat was recorded at all seven sub-sites by the CMP (Ryle *et al.*, 2009)

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.

In 1996, the Biomar Machair Survey surveyed all sand dune sites at which machair formed a significant element (Crawford *et al.*, 1996). Comparison of the CMP with this 1992 survey revealed considerable degradation of machair habitat which could be attributed to changes in farming practices which has seen many machair commonages being fenced (stripped) resulting in greater concentration of livestock in confined areas, overgrazing, supplementary feeding and poaching of the land (Ryle *et al.*, 2009).

Within the North Inishowen Coast SAC, the most extensive remaining area of machair is found at Doagh Isle with another relatively small area to be found at Tullagh Point (Natura 2000). Machair was also recorded at Lenankeel and White Strand sub-sites by the CMP (Ryle *et al.*, 2009).

The CMP surveyed seven sub-sites within North Inishowen Coast SAC:

1. Lenankeel
2. Tullagh
3. Doagh Isle
4. Lagg
5. White Strand
6. Culdaff
7. Crummies Bay

As part of the Coastal Monitoring Project (CMP) detailed individual reports and habitat maps were produced for all sub-sites and those compiled for Lenankeel, Tullagh, Doagh Isle, Lag, White Strand and Culdaff are included in a set of Appendices to this document (Appendix IV to IX). The updated site reports and habitat maps for Crummies Bay from the Sand Dunes Monitoring Project (SDM) are included in Appendix X.

The combined data from the CMP for the sub-sites at Lenankeel, Tullagh, Doagh Isle, Lag, White Strand and Culdaff, along with the data from the SDM for the sub-site at Crummies Bay is presented in Appendix II.

#### **4.1 Overall objectives**

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

The overall objective for 'Machair' in North Inishowen Coast SAC is to 'restore the favourable conservation condition'.

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

#### **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. A baseline habitat map was produced for the sand dune habitats at each sub-site in North Inishowen Coast SAC during the Coastal Monitoring Project (CMP) (Ryle *et al.*, 2009). The maps are included with the individual site reports for Lenankeel, Tullagh, Doagh Isle, Lag, White Strand and Culdaff in the Appendices at the end of this document. The baseline habitat map for Crummies Bay was reviewed and updated during the Sand Dunes Monitoring Project (SDM) (Delaney *et al.*, 2013) and these updated maps are included with the individual site report in the Appendices at the end of this document. The data from the CMP and SDM has been combined to 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.

#### 2130\* Fixed coastal dunes with herbaceous vegetation

Sub-site	Data source used	Total area within SAC boundary (ha)
Lenankeel	CMP	6.27
Tullagh	CMP	30.81
Doagh Isle	CMP	324.53
Lag	CMP	103.17
White Strand	CMP	2.33
Culdaff	CMP	17.03
Crummies Bay	SDM	11.92
<b>Total</b>		<b>496.06</b>

#### 21A0\* Machair

Sub-site	Data source used	Total area within SAC boundary (ha)
Lenankeel	CMP	12.15
Tullagh	CMP	15.42
Doagh Isle	CMP	90.11
Lag	CMP	-
White Strand	CMP	0.25
Culdaff	CMP	-
Crummies Bay	SDM	-
<b>Total</b>		<b>117.96</b>

The general target for this attribute in the case of each habitat is that the area should be stable, or increasing. Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is always assessed subject to natural processes, including erosion and succession.

### 4.3 Range

#### 4.3.1 Habitat distribution

Fixed dunes occur at all seven sub-sites while machair was only recorded at Lenankeel, Tullagh, Doagh Isle and White strand sub-sites (Ryle *et al.*, 2009).

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

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

#### **4.4 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 North Inishowen Coast SAC in terms of structure and functions depends on a range of attributes for which targets have been set as outlined below.

##### **4.4.1 Physical structure: functionality and sediment supply**

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

Dunes are naturally dynamic systems that require continuous supply and circulation of sand. Sediment supply is especially important in the embryonic dunes and mobile dunes, as well as the strandline communities where accumulation of organic matter in tidal litter is essential for trapping sand and initiating dune formation. The construction of physical barriers such as sea defences can interrupt longshore drift, leading to beach starvation and increased rates of erosion. Sediment circulation and erosion also has a role to play in the more stabilised dune habitats. Cycles of erosion and stabilisation are part of a naturally functioning dune system, where the creation of new bare areas allows pioneer species and vegetation communities to develop, increasing biodiversity. The construction of physical barriers can interfere with the sediment circulation by cutting the dunes off from the beach resulting in fossilisation or over-stabilisation of dunes.

At Lenankeel sub-site the presence of rock armour is affecting the natural build up of the sand system, which appears to be eroding (Ryle *et al.*, 2009).

There are historic accounts of removal of beach material from the sub-site at Tullagh. The removal of gravel was recorded from at least one area on the beach, while the extraction of sand from within the machair was observed on the northern end of the site by the CMP (Ryle *et al.*, 2009). Natural erosion is also a feature of the site and there are obvious signs of erosion towards the western end of the site, and the fixed dunes around Tullagh Point are scoured by the tidal cycle. Further east, however, this is not the case and a large volume of shifting sand has accumulated (Ryle *et al.*, 2009)

At the Doagh Isle sub-site, sand extraction was noted from both the fixed dunes and machair. This activity, along with others such as overgrazing is undermining the structure of the habitat (Ryle *et al.*, 2009).

At Lag sub-site some coastal protection works are affording some stabilisation and protection the mobile dune habitat at the site, however, over the long term they will cause a disruption to the natural functioning of the system (Ryle *et al.*, 2009).

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

#### **4.4.2 Physical structure: hydrological and flooding regime**

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

Wet machair can essentially be compared to humid dune slacks due to the periodic fluctuations and the proximity of the groundwater table to the surface throughout the year. The frequency and duration of periods of flooding or inundation determines the vegetation composition. The 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.

#### **4.4.3 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 the North Inishowen Coast SAC a range of coastal habitats occur alongside the qualifying interest habitats of fixed dune and machair.

At Crummies Bay, the fixed dunes occur alongside annual vegetation of driftlines, embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* and decalcified fixed dunes with *Empetrum nigrum*.

At Lenankeel, fixed dunes and machair occur in association with shifting dunes along the shoreline with *Ammophila arenaria*, perennial vegetation of stony banks, and annual vegetation of driftlines.

At Tullagh, the fixed dune and machair occur alongside embryonic shifting dunes, and shifting dunes along the shoreline with *Ammophila arenaria*.

At the Doagh Isle sub-site, the fixed dune and machair occur alongside annual vegetation of driftlines, perennial vegetation of stony banks, embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* and humid dune slacks.

At the Lag sub-site, habitats such as annual vegetation of driftlines, perennial vegetation of stony banks, embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria*, dunes with *Salix repens* ssp. *argentea* (*Salicion arenaria*) and humid dune slacks, occur alongside the fixed dunes.

At the Culdaff sub-site, embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* and humid dune slacks occur along with fixed dunes.

At White Strand, embryonic shifting dunes, perennial vegetation of stony banks, and annual vegetation of driftlines, occur along with fixed dunes and machair.

Small areas of saltmarsh were also recorded by the CMP at Culdaff, Doagh Isle, Lag, Tullagh and White Strand (Ryle *et al.*, 2009).

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

#### **4.4.4 Vegetation structure: bare ground**

This target applies to fixed dunes and machair. In the fixed and machair areas some degree of instability is vital. Constant cycles of erosion and stabilisation provide the necessary conditions for the establishment of pioneer species and species that favour open conditions including invertebrates, helping to increase biodiversity.

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

#### **4.4.5 Vegetation structure: vegetation height**

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

The grazing levels vary throughout the sub-sites in North Inishowen Coast SAC.

The absence of grazing at Crummies Bay has produced a rank, long sward with low species diversity (Ryle *et al.*, 2009; Delaney *et al.*, 2013).

At Tullagh the site is fenced and the majority is grazed to a high intensity with associated heavy poaching in places (Ryle *et al.*, 2009).

At Lenankeel the fixed dune and machair are fenced and the fields are managed individually, some fields are grazed and others are ungrazed (Ryle *et al.*, 2009).

Undergrazing is a feature of the sand dune habitats at the Culdaff sub-site resulting in a long, rank sward with low species diversity throughout (Ryle *et al.*, 2009).

The fixed dunes at Lag are grazed by both cattle and sheep and the grazing intensity is such that it may be considered a positive influence, with no significant overgrazed areas (Ryle *et al.*, 2009).

The fixed dunes and machair at White Strand are grazed to varying degrees. Some of the machair is very undergrazed and as a result is rank in character (Ryle *et al.*, 2009).

The fixed dune and machair at Doagh Isle are also grazed to varying intensities. The impact of low-level grazing has been positive in parts of the site, most notably in the eastern part of the machair and small areas of the fixed dunes, however, overgrazing by sheep and rabbits has a negative impact and a significant area of machair and fixed dune (Ryle *et al.*, 2009).

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

#### **4.4.6 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
<i>Festuca rubra</i>	<i>Trifolium repens</i>
<i>Plantago lanceolata</i>	<i>Agrostis stolonifera</i>
<i>Trifolium repens</i>	<i>Calliargonella cuspidata</i>
<i>Lotus corniculatus</i>	<i>Festuca rubra</i>
<i>Bellis perennis</i>	<i>Bellis perennis</i>
<i>Galium verum</i> *	<i>Plantago lanceolata</i>
<i>Carex arenaria</i>	<i>Carex arenaria</i>
<i>Rhytidadelphus squarrosus</i> *	<i>Potentilla anserina</i>
<i>Leontodon taraxacoides</i> *	<i>Hydrocotyle vulgaris</i>
<i>Poa pratensis (subcaerulea)</i> *	<i>Lotus corniculatus</i>
<i>Homalothecium lutescens</i> *	<i>Prunella vulgaris</i>

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 seven sub-sites of the North Inishowen Coast SAC support a characteristic dune flora, details of which can be found in the site reports from the CMP (Ryle *et al.*, 2009) and SDM (Delaney *et al.*, 2013) which are included in Appendices IV to X.

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

#### 4.4.7 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.

Negative indicators for machair habitat include agricultural grasses, species indicative of changes in nutrient status (e.g. *Urtica dioica*) and species not considered characteristic of the habitats.

At Culdaff, bracken (*Pteridium aquilinum*) was recorded as well as a large stand of montbretia (*Crocsmia x crocosmiiflora*) (Ryle *et al.*, 2009).

At Lag, nitrophilous weeds such as creeping thistle (*Cirsium arvense*) and common nettle (*Urtica dioica*) are associated with the supplementary feeding stations within the fixed dunes (Ryle *et al.*, 2009).

At Tullagh, bracken (*Pteridium aquilinum*) is spreading through the marram dominated fixed dune (Ryle *et al.*, 2009).

The target is that negative indicators (including non-native species) such as *Hippophae* should represent less than 5% of the vegetation cover and for machair they should be absent or under control.

#### **4.4.8 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.

At the Culdaff sub-site there are several areas of quite dense scrub throughout the site, the most widespread of which is blackthorn (*Prunus spinosa*), which forms both dense stands and scattered clumps (Ryle *et al.*, 2009)

At Crummies Bay, scrub dominated by willows (*Salix* spp.) in wetter areas and blackthorn (*Prunus spinosa*) and bramble (*Rubus fruticosus*) in drier areas, appears to be spreading at the expense of the dune grassland (Ryle *et al.*, 2009; Delaney *et al.*, 2013).

The target for this attribute therefore is that the cover of scrub and tree species should be under control or represent no more than 5% of the vegetation cover.

#### **4.4.9 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 always be at least an occasional component of the vegetation (Ryle *et al.*, 2009).

## 5 Vegetated sea cliffs

Sea cliffs can be broadly divided into two categories: hard (or rocky) cliffs and soft (or sedimentary) cliffs, both of which are covered by Annex I habitat 'vegetated sea cliffs of the Atlantic and Baltic coasts'. Hard cliffs are composed of rocks such as limestone, sandstone, granite or quartzite which are hard and relatively resistant to erosion. Soft cliffs are composed of softer rock such as shale or unconsolidated material such as glacial till. Vegetation of hard sea cliffs in exposed situations exhibits a strong maritime influence and is relatively stable. Soft cliff habitats are more prone to slope failure which results in the presence of fast-colonising pioneer species.

The North Inishowen Coast SAC contains large areas of sea cliff spread throughout the site with the best examples to be found in the west of the site (Dunree to Leenan Head and Dunaff Head) and in the area north-west of Glengad Head. The Sea Cliff survey identified 11 sea cliff sites (Glengad, Altnadarrow, Binbane, Carrickabraghy, Binnion, Dunaff, Lenan, Lederg, Mossy Glen, Tirmacroragh, and Stookannillar and Five Fingers) within the North Inishowen SAC, two of which were surveyed in the field (Dunaff and Stookannillar and Five Fingers). A further undocumented site at Dunree was also identified. Hard cliffs are the predominant cliff type, although occasional soft cliffs were also recorded by the ISCS (Barron *et al.*, 2011)

Defining the limits of what constitutes a sea cliff is problematic and a number of different interpretations have been used in the past (Fossitt, 2000; JNCC, 2004; Browne, 2005; Commission of the European Communities, 2007). In order to address any inconsistencies, the following definition for sea cliffs was developed and used during the Irish Sea Cliff Survey (Barron *et al.* 2011):

"A sea cliff is a steep or vertical slope located on the coast, the base of which is in either the intertidal (littoral) or subtidal (sublittoral) zone. The cliff may be composed of hard rock such as basalt, or of softer substrate such as shale or boulder clay. Hard cliffs are at least 5m high, while soft cliffs are at least 3m high. The cliff top is generally defined by a change to an obvious less steep gradient. In some cases the cliff may grade into the slopes of a hillside located close to the coast. In these cases the cliff is defined as that part of the slope which was formed by processes of coastal erosion, while the cliff top is where there is the distinct break in slope. Both the cliff and the cliff top may be subject to maritime influence in the form of salt spray and exposure to coastal winds. A cliff can ascend in steps with ledges, and the top of the cliff is taken to occur where erosion from wave action is no longer considered to have been a factor in the development of the landform. The cliff base may be marked by a change in gradient at the bottom of the cliff. Where the base is exposed it can be characterised by scree, boulders, a wave-cut platform or sand, among other substrates. During this survey where cliffs occur within the subtidal zone the base was considered to be

the high water mark. A cliff is considered to have reached its end point where it is no longer over 5m high (hard cliffs) or 3m high (soft cliffs), or no longer has a steep slope. To be considered in this study, a cliff had to be a minimum of 100m in length. Sea cliffs may support a range of plant communities such as grassland, heath, scrub and bare rock communities, among others.”

## **5.1 Overall Objective**

The overall objective for ‘vegetated sea cliffs of the Atlantic and Baltic coasts’ in North Inishowen Coast SAC is to ‘Maintain favourable conservation condition’. The 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) 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. The target 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 sea cliffs are distributed throughout the North Inishowen Coast SAC (Natura 2000, Browne 2004; Barron *et al.* 2011).

As cliffs are linear features on maps, their extent is measured in kilometres rather than hectares, as you would with other habitats. During the ISCS (Barron *et al.* 2011), each cliff was divided into sections based on physical characteristics and vegetation cover. Breaks (i.e. non-cliff areas) of between 80m and 500m along a length of cliff were discounted from the calculations.

The total length of the cliff sections within each sub-site in the North Inishowen Coast SAC is presented in the following table. The area of each cliff that is located within the SAC boundary is also presented.

Site name	Total area/length (km) of sea cliff from ISCS	Total area/length (km) of sea cliff within SAC boundary
Mossy Glen	15.931	15.7
Altnadarow	4.372	4.4
Binbane	1.221	1.2
Stookanillar and Five Fingers	3.308	3.3
Carrickabraghy	1.902	1.9
Binnion	3.314	3.3
Dunaff	6.372	6.4
Lenan	2.077	0.7
Lederg	6.010	3.7
Tirmacroragh	5.744	5.6
Glengad	21.534	21.5
<b>Totals</b>	<b>71.785</b>	<b>67.7</b>
Dunree (undocumented site)	–	0.3
<b>Totals</b>	<b>71.785</b>	<b>68.0</b>

The estimated area of sea cliffs within the North Inishowen Coast is 68.0.

There are a number of differences in the two sets of figures above. Most of the differences are explained by the fact that the ISCS mapped the total sea cliff resource at the site and not all of the sea cliff mapped is contained within the SAC boundary. In addition, the county boundary line was used to draw the line for the ISCS, while a different mapping dataset than was used to draw the SAC boundary. As a result the length of cliff inside the SAC boundary may be underestimated. The total length of cliff sections at North Inishowen Coast SAC was 71.8km. However when, this dataset was clipped to the SAC boundary, 68.0km was included in the boundary. However in reality this figure is likely to be higher as a result of these mapping anomalies.

### 5.3 Range

#### 5.3.1 Habitat Distribution

The distribution of sea cliffs throughout the North Inishowen Coast SAC as identified by the Irish Sea Cliff Survey is presented in Appendix III. The North Inishowen Coast SAC contains

large areas of sea cliff spread throughout the site with the best examples to be found in the west of the site (Dunree to Leenan Head and Dunaff Head) and in the area north-west of Glengad Head. The hard cliffs in North Inishowen Coast are not likely to be redistributed through natural processes, unlike other more dynamic coastal systems such as sand dunes or saltmarshes.

## **5.4 Structure and Functions**

A fundamental aim of sea cliff conservation is to facilitate some degree of natural mobility through slumping. Sea cliffs can be of geomorphological interest as well as ecological interest and also erosion can expose geological features of interest.

### **5.4.1 Functionality and hydrological regime**

Coastal protection works can disrupt the natural integrity of a sea cliff. The health and ongoing development of vegetated sea cliffs relies on natural processes such as erosion continuing without any impingement. This is generally a bigger issue for soft cliffs which require a degree of slumping and erosion to expose bare soil for pioneer species to colonise; otherwise the vegetation is replaced by hardy grasses and scrub of little conservation value can develop. In addition, cliff erosion provides an important sediment source to sites further along the coast (e.g. sand dunes). Preventing erosion at a cliff site can lead to beach starvation at another site.

Flushes can be associated with cliffs in areas where the groundwater seeps out onto the cliff face. This is more usually associated with soft cliffs where these flushes contribute to the natural instability of the ground and provide patches of wetland habitat.

Within the North Inishowen Coast SAC, hydrological features such as gullies, streams or cascades, were associated with nine out of eleven sub-sites: Mossy Glen, Stookanillar and Five Fingers, Binnion, Dunaff, Lenan, Lederg, Tirmacroragh, and Glengad.

The target is to maintain, or where necessary restore, the natural geomorphological processes without any physical obstructions, and the local hydrological regime including ground water quality.

### **5.4.2 Vegetation structure: zonation**

Ecological variation in this habitat type depends on a number of physical and biological factors, in particular climate, degree of exposure to sea-spray, geology and soil type, as well as the level of grazing and sea bird activity. The rocky cliff flora often grades naturally in to coastal heath vegetation and maritime grassland.

At the Stookanillar and Five Fingers sub-site, the ISCS recorded four zones: heath, scree, crevice ledge and grazed coastal grassland on hard cliffs.

At the Dunaff sub-site three zones were recorded: splash zone, crevice ledge and ungrazed coastal grassland on hard cliffs.

The target is to maintain the sea cliff habitat, as well as transitional zones, including those to terrestrial communities.

#### **5.4.3 Vegetation structure: vegetation height**

A varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds. Grazing increases the species diversity and is particularly important for maritime grasslands and coastal heath, which are often associated with sea cliffs. The target is to maintain the structural variation in the sward height.

#### **5.4.4 Vegetation composition: typical species & sub-communities**

Different sea cliff communities develop in a number of habitat zones related to the degree of maritime influence (exposure to wind and sea spray), geology and soil type. In general, Irish sea cliffs display a range of zones running in a series of horizontal bands up the cliff face, each of which has its own distinct sub-communities including:

- Splash zone
- Pioneer zone
- Rock crevice/cliff ledge zone
- Maritime grassland zone
- Maritime heath zone
- Maritime slope flush zone

There is considerable variation but the general pattern would be that the maritime influence is strongest near the base of the cliff and becomes gradually less dominant towards the cliff top. At the cliff base, vegetation is naturally very open and the species present have a high tolerance to salinity. The splash zone generally has a well-developed lichen flora dominated by species such as *Verrucaria maura*, *Ramalina* spp. and *Xanthoria* spp. These plant communities are dependent on rock crevices for rooting. Moving up the cliff, between the splash zone and the cliff top, vegetation on the cliff ledges is less open and can support some species which are not exclusively associated with coastal conditions. Closer to the cliff to maritime grasslands can occur. The plant communities and physical characteristics of maritime grasslands vary depending on the degree of exposure and whether or not grazing is a factor. Plant communities typical of sea birds and maritime therophyte communities are

exceptions to this horizontal zonation and can occur as a mosaic with the other plant communities. The following table presents lists of species that are considered typical of the different zones associated with hard cliffs by Barron *et al.* (2011), such as those found in North Inishowen Coast.

<b>Typical splash zone species on hard cliffs</b>		
<i>Ramalina spp</i>	<i>Verrucaria maura</i>	<i>Xanthoria spp</i>
<b>Typical crevice and ledge species on hard cliffs</b>		
<i>Anthyllis vulneraria</i>	<i>Asplenium marinum</i>	<i>Armeria maritima</i>
<i>Aster tripolium</i>	<i>Atriplex prostrata</i>	<i>Beta vulgaris ssp. maritima</i>
<i>Catapodium marinum</i>	<i>Cerastium diffusum</i>	<i>Crithmum maritimum</i>
<i>Festuca rubra</i>	<i>Inula crithmoides</i>	<i>Lavatera arborea</i>
<i>Ligusticum scoticum</i>	<i>Limonium sp</i>	<i>Plantago coronopus</i>
<i>Plantago maritima</i>	<i>Sedum anglicum</i>	<i>Sedum rosea</i>
<i>Silene uniflora</i>	<i>Spergularia rupicola</i>	
<b>Typical coastal heath species</b>		
<i>Calluna vulgaris</i>	<i>Daboecia cantabrica</i>	<i>Empetrum nigrum</i>
<i>Erica cinerea</i>	<i>Erica tetralix</i>	<i>Scilla verna</i>
<i>Ulex gallii</i>	<i>Vaccinium myrtillus</i>	

<b>Typical maritime grassland species on hard cliffs</b>		
<i>Anthyllis vulneraria</i>	<i>Armeria maritima</i>	<i>Crithmum maritimum</i>
<i>Daucus carota</i>	<i>Festuca rubra</i>	<i>Hyacinthoides non-scripta</i>
<i>Plantago coronopus</i>	<i>Plantago maritima</i>	<i>Scilla verna</i>
<i>Sedum anglicum</i>	<i>Silene uniflora</i>	<i>Spergularia rupicola</i>

At Stookanillar and Five Fingers, common crevice ledge species include: sea pink (*Armeria maritima*), bell heather (*Erica cinerea*), fescues (*Festuca ovina/rubra*), cat's-ear (*Hypochoeris radicata*), rock samphire (*Crithmum maritimum*), wild carrot (*Daucus carota*), sea plantain (*Plantago maritima*), sea mayweed (*Tripleurospermum maritimum*), ling heather (*Calluna vulgaris*) and burnet rose (*Rosa pimpinellifolia*), *Anaptychia runcinata*, *Ochlorenchia parella*, *Ramalina sp.*, *Xanthoria parietina*. Within the heath zone common species include false oat grass (*Anthoxanthum odoratum*), ling heather (*Calluna vulgaris*), bell heather (*Erica cinerea*) and primrose (*Primula vulgaris*). The scree zone supports species such as fescues (*Festuca ovina/rubra*), wood sage (*Teucrium scorodonia*), false oat grass (*Anthoxanthum odoratum*), tormentil (*Potentilla erecta*), and *Pseudoscleropodium purum*. The grazed coastal grassland on hard cliffs at this sub-site supports species such as ling heather (*Calluna vulgaris*), cock's foot (*Dactylis glomerata*), fescues (*Festuca ovina/rubra*), Yorkshire fog (*Holcus lanatus*), heath wood rush (*Luzula multiflora*), great wood-rush (*Luzula sylvatica*), smooth meadow grass (*Poa pratensis*), common sorrel (*Rumex acetosa*), bush vetch (*Vicia sepium*), sea pink

(*Armeria maritima*), rock samphire (*Crithmum maritimum*), wild carrot (*Daucus carota*), sea plantain (*Plantago maritima*), common bent (*Agrostis capillaris*), soft brome (*Bromus hordeaceus*), long-leaved plantain (*Plantago lanceolata*), silver weed (*Potentilla anserina*), selfheal (*Prunella vulgare*), dandelion (*Taraxacum* agg.), false oat grass (*Anthoxanthum odoratum*), bell heather (*Erica cinerea*), burnet rose (*Rosa pimpinellifolia*) and wild thyme (*Thymus polytrichus*) (Barron *et al.*, 2011).

At the Dunaff sub-site a splash zone dominated by Verrucaria species occurs. The crevice ledge zone at this sub-site supports species such as sea pink (*Armeria maritima*), fescues (*Festuca ovina/rubra*), sea campion (*Silene uniflora*), *Ochrolechia parella*, and *Ramalina* species. While fescues (*Festuca ovina/rubra*) is also dominant in the ungrazed coastal grassland on hard cliffs zone (Barron *et al.*, 2011).

Rare species that occur on sea cliffs at this SAC site include, Scot's lovage (*Ligusticum scoticum*), moss campion (*Silene acaulis*), purple saxifrage (*Saxifraga oppositifolia*), ivy broomrape (*Orobanche hederæ*) and roseroot (*Sedum rosea*) (NPWS internal files).

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

#### **5.4.5 Vegetation composition: negative indicator species**

Negative indicator species can include non-native species (e.g. *Hebe* sp., *Carpobrotus edulis*, *Gunnera tinctoria*), species indicative of changes in nutrient status (e.g. *Urtica dioica*) and species not considered to be typical of the habitat (e.g. *Pteridium aquilinum*).

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

#### **5.4.6 Vegetation composition: bracken and woody species**

Encroachment of bracken (*Pteridium aquilinum*) and woody/scrub species on cliffs, particularly the maritime grasslands and coastal heath leads to a reduction in species diversity.

Bracken (*Pteridium aquilinum*) was recorded in the scree and grazed coastal grassland zones of Stookanillar and Five Fingers.

The target for this attribute is that in the case of maritime grassland and/or heath, bracken should make up less than 10% of the vegetation cover, while woody species should make up no more than 20% of the vegetation cover.

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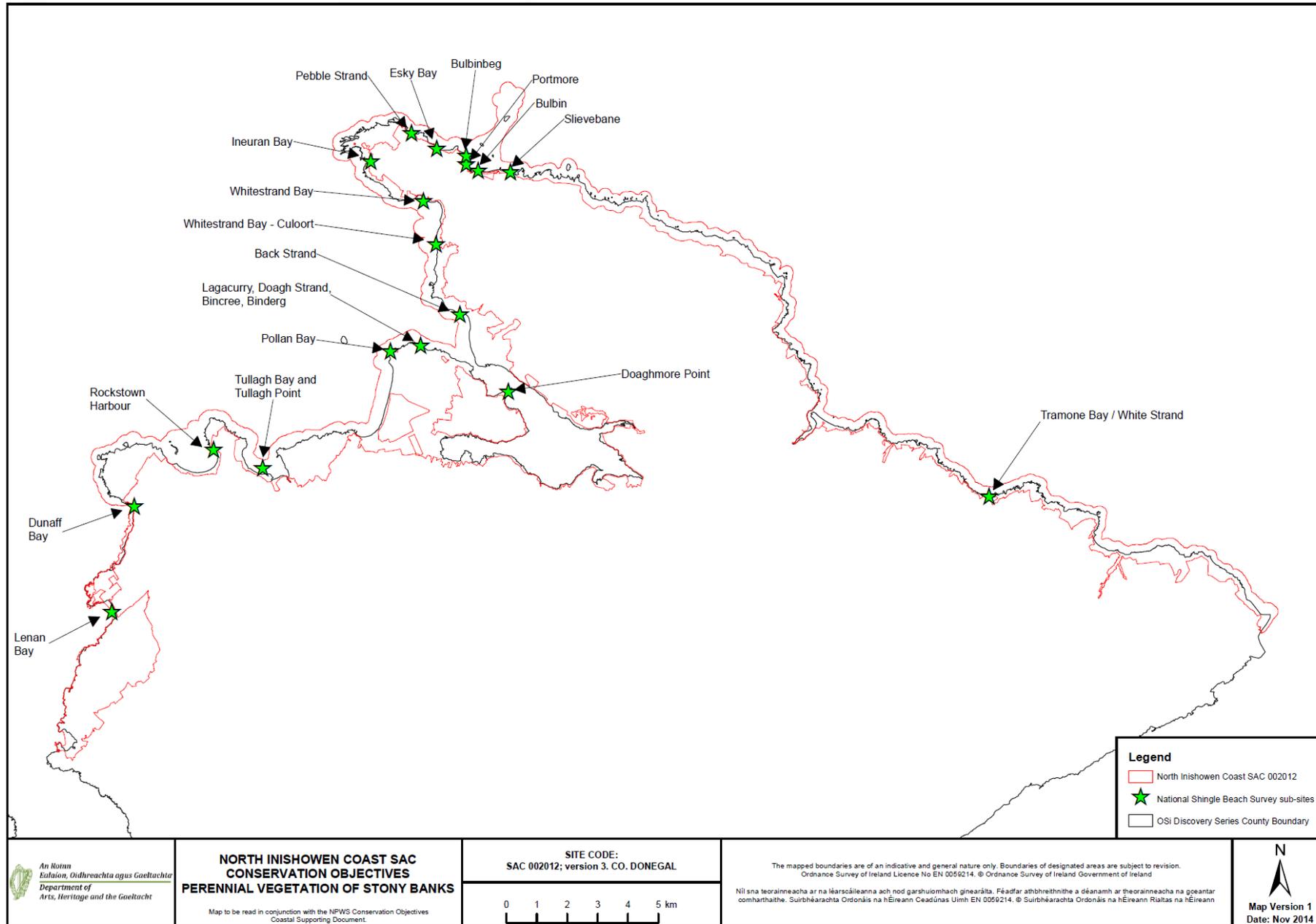
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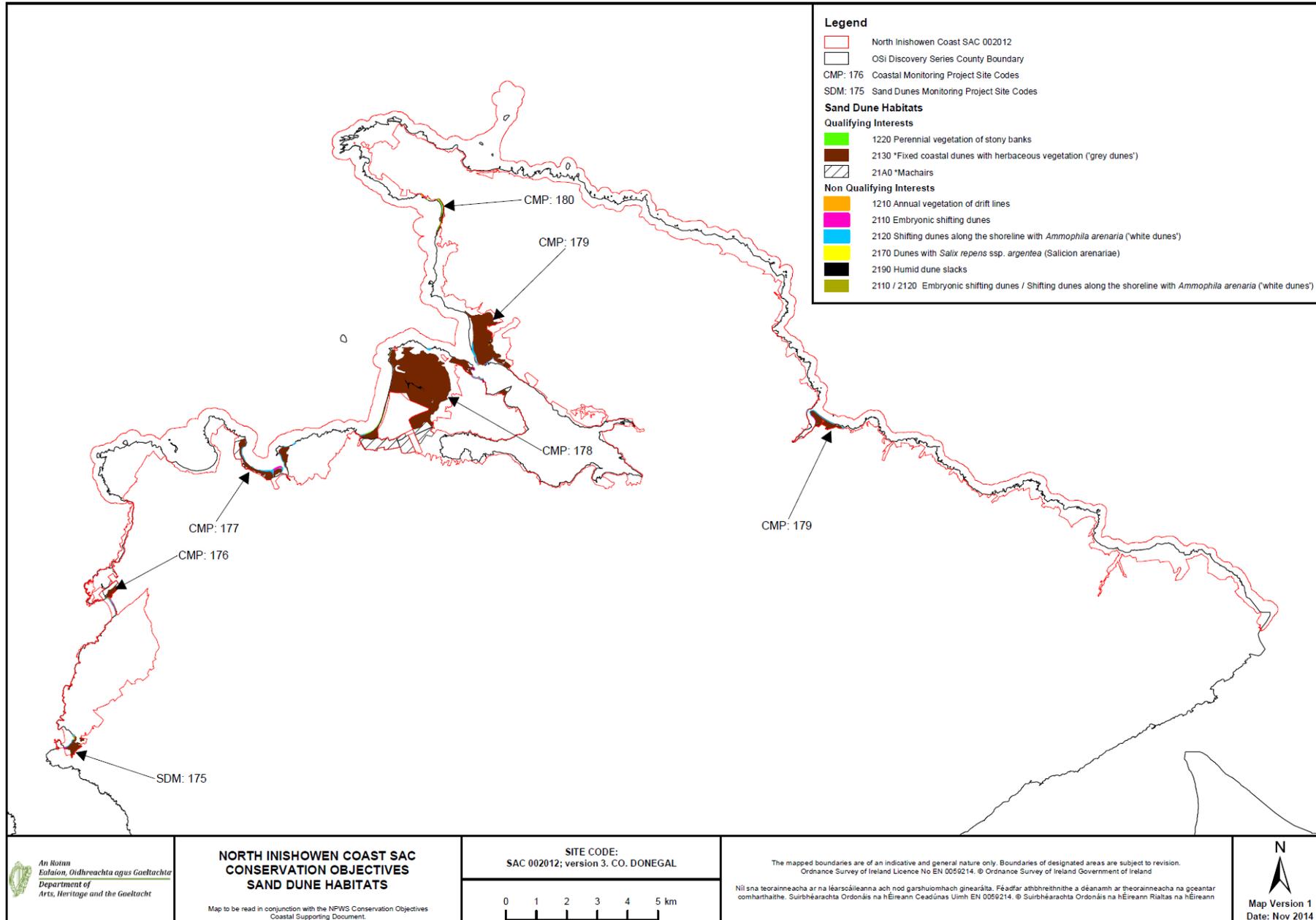
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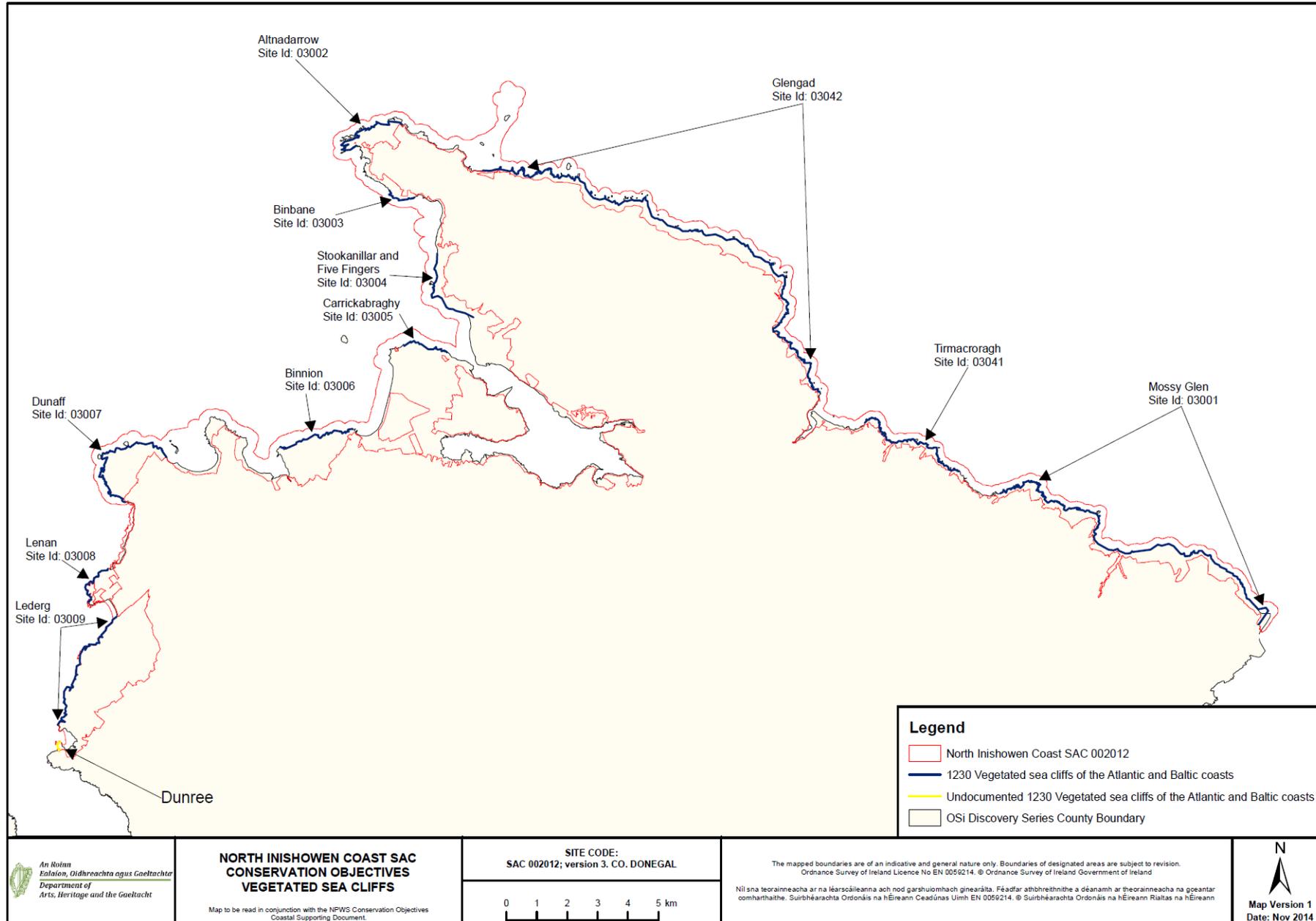
# Appendix I – Distribution map of known shingle sites within North Inishowen Coast SAC



## Appendix II – Distribution map of sand dune habitats within North Inishowen Coast SAC



# Appendix III – Distribution map of vegetated sea cliffs within North Inishowen Coast SAC



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

### **SITE DETAILS**

CMP06 site name: **Lenankeel**      CMP06 site code: **176**   CMP Map No.: **174**

County:**Donegal**      Discovery map: **3**      Grid Reference: **C 305 440**

6 inch Map No.: **Dg 01 & 02 & 04**

Aerial photographs (2000 series): **O 0029-D; O 0045-A, B, D.**

NPWS Site Name: **North Inishowen Coast**

NPWS designation:   pNHA: **2012**   cSAC: **2012**

Ranger Area: **West**

MPSU Plan: **Draft 2 Consultation 2000**

Report Author: **Melinda Swann**

### **SITE DESCRIPTION**

Lenankeel is part of the North Inishowen Coast cSAC 2012, which stretches for approximately 45 km around the coastline from Crummie’s Bay in the west, up to Malin Head and back down to Inishowen Head to the east. There are a great variety of habitats along the coastline and the cSAC is noted for the extensive shingle beaches. The sea cliffs are also a feature of the cSAC and the best examples are found at Dunree to Lenan Head and Dunaff Head. A number of rare plant species have been recorded in the cSAC including *Ligusticum scoticum* (Scot’s lovage). Also recorded recently on the sea cliffs to the north of Lenan Head is a locally rare species of broomrape (*Orobanche hederæ*), which is parasitic on *Hedera helix* (Ivy). Also found on the sea cliffs within the cSAC are species such as *Silene acaulis* (Moss campion) and *Saxifraga oppositifolia* (Purple saxifrage), which are listed in the Red Data Book as they are protected in Northern Ireland. The rare and legally protected Oyster plant (*Mertensia maritima*) has also been recorded within the cSAC on shingle habitat.

The cSAC has been designated for the presence of the Annex I habitats ‘Fixed coastal dunes with herbaceous vegetation’ (priority habitat), ‘Machair (priority in Ireland only), ‘Vegetated sea cliffs of the Atlantic and Baltic Coasts’, Perennial vegetation of

stony banks’, ‘Dry heaths’, Annual vegetation of driftlines’, Estuaries’ and ‘Mudflats and sandflats not covered by seawater at low tide’.

The sea cliffs provide important nesting and feeding areas for a number of Annex I species of bird, such as *Pyrrhocorax pyrrhocorax* (Chough) and *Falco peregrinus* (Peregrine falcon).

The Annex II mammal species, *Lutra lutra* (Otter) is also regularly seen along the coastline within the cSAC.

Lenankeel beach is located in Lenan Bay south of Lenan Head. The beach is the only part of this site that is within the cSAC 2012. The rest of the sand dune habitat has been removed from the designation presumably as a result of the presence of a caravan park here in the past. According to the MPSU management plan for the cSAC, the caravan park was being developed in the sand dune habitat and consisted of approximately 30 caravans. No caravan park was present during the site visit in 2006 and the area seemed to be recovering from any past disturbance. There was some evidence still remaining but as the caravan site has been removed, this is a positive development for the area. The beach is backed by a steep mobile dune ridge which grades into fixed dune and machair landward. There is an area of semi-fixed dunes, which extends up the hill north of the beach and grades into machair on the top of the hill. Both the fixed dunes and machair are fenced into fields, which extend northwards behind a number of houses, which have been built on the habitats along the access road to the beach. East of the road, the land is low-lying and extends back to the hills beyond. This whole area is heavily cultivated and improved. It may, however, have been an extension of the machair plain or system, in the past, as there are a number of wet areas with *Phragmites australis* (Common reed) along the edges of the fields.

The current survey concentrates on Annex I sand dune habitats found at Lenankeel and include machair, fixed dunes, mobile dunes, perennial vegetation of stony banks and strandline. The areas of Annex I sand dune habitats recorded at Lenankeel are shown in Table 176A.

**Table 176A** Areas of EU Annex I habitats mapped at Lenankeel

EU Code	EU Habitat	Area (ha)
H21AO	Machair	27.5
H2130	Fixed Dunes	11.4
H2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i>	0.36
H1220	Perennial Vegetation of stony banks	0.009
H1210	Annual Strandline	0.045
	<b>Total Sand dune</b>	<b>39.4</b>
	<b>Sandy substrate area including developments/modifications*</b>	<b>42.5</b>

\*Developments include houses 3.15ha

### **Machair (H21AO)**

The machair habitat comprises 27.5ha (approximately 69% of the total sand dune habitat) at Lenankeel (Table 176A). This area has not been previously described as machair and so is one of the new sites along with an area at Rinclevan (CMP Site Code - 162) near Dunfanaghy in County Donegal that has been added to the current list of machair sites in Ireland. The machair habitat is quite extensive at Lenankeel and is distinctive as it consists of both flat machair grassland and an area of machair that extends up over a hill. This is similar to Garter Hill (CMP Site Code – 128) in County Mayo. The machair plain is fenced in a southeast-northwest direction and the fields seem to be individually owned. Some of the fields are grazed by cattle or sheep and have a characteristic short sward with a relatively good diversity of species, while other fields are ungrazed with the consequence being lower species diversity. There are some agricultural weeds in the habitat and some improvement may have occurred in the past. One ring feeder was also noted in one of the fields indicating supplementary feeding is being carried out. Overall the habitat seems to be intact although there was some erosion due to trampling by animals and rabbit burrowing at the seaward side.

The machair on top of the hill was also mostly fenced and grazed in places with other areas left ungrazed. The sward was species-rich, with an abundance of typical species present. There were some rabbit burrows noted on the higher ground also, which exacerbates erosion. The machair habitat at Lenankeel is an interesting feature of the area as it occurs on flat ground as well as on a hill. As the habitat has been fenced and been built on in places it has been somewhat altered. Furthermore, as the habitat is not within the cSAC any management for conservation purposes is unlikely to occur.

Although it seems that it would take minimum effort in order to restore the machair if cooperation from the landowners was acquired. The MPSU Management Plan states that one of its objectives is to make boundary changes, in order to improve the ecological status of the fixed dunes and machair habitats for the cSAC as a whole. However it is not clear whether this will apply to Lenankeel.

The typical species found in the machair include: *Galium verum* (Lady's bedstraw), *Euphrasia officinalis* agg. (Eyebright), *Linum catharticum* (Fairy flax), *Plantago lanceolata* (Ribwort plantain), *Prunella vulgaris* (Selfheal), *Trifolium repens* (White clover), *Cerastium fontanum* (Common mouse-ear), *Lotus corniculatus* (Common bird's-foot trefoil), *Bellis perennis* (Daisy), *Carex arenaria* (Sand sedge) and *Thymus polytrichus* (Wild thyme).

Other species noted in the machair include: *Agrostis stolonifera* (Creeping bent), *Carex flacca* (Glaucous sedge), *Vicia* spp. (Vetch spp.), *Festuca rubra* (Red fescue), *Daucus carota* (Wild carrot), *Cynosurus cristatus* (Crested dog's-tail), *Equisetum* spp. (Horsetail spp.), *Centaurea nigra* (Common Knapweed), *Campanula rotundifolia* (Harebell), *Luzula campestris* (Field wood-rush), *Pilosella officinarum* (Mouse-ear-hawkweed), *Poa* spp. (Meadow-grass), *Polygala vulgaris* (Common milkwort), *Viola* spp. (Wild pansy spp.), *Trifolium pratense* (Red clover), *Dactylis glomerata* (Cock's-foot). The moss *Thuidium tamariscinum* was found on the machair on the hill but overall bryophyte cover was low.

The negative indicator species *Cirsium arvense* (Creeping thistle) was noted in the habitat along with *Senecio jacobaea* (Common ragwort).

### **Fixed Dunes (H2130)**

The fixed dune habitat comprises 11.4ha (approximately 29% of the total sand dune habitat) at Lenankeel (Table 176A). The fixed dunes consist of an area of low dune ridges, which are located on the low-lying land behind the mobile dune ridge. The ridges are composed of *Ammophila arenaria* (Marram grass) hummocks interspersed with a short sward, which then grade into flatter, fenced fixed dune grassland landward. The fixed dune grassland then grades into machair further inland. There is

also an area of semi-fixed dunes, which extends up the hill at the northern end of the beach.

The semi-fixed dunes have developed here as a result of wind blown sand gathering in the lee of the hill. *Ammophila arenaria* (Marram grass) dominates and the habitat then grades into machair on the top of the hill. The fixed dunes are relatively intact, although there is evidence of past disturbance as a result of the presence of a caravan park. This has now been removed although some metal is scattered in places in the habitat and there are a number of old cars dumped in the fields behind the house nearest to the sea. The fixed dune grassland is eroded in places as a result of the presence of a large population of rabbits. There is also some driving across the habitat, which is further leading to erosion of the surface. The characteristic typical species were noted in the habitat but some areas of the sward were rank as no grazers were present to the seaward side. There is a car park located in the habitat near the beach and there is some erosion at the southern end of the beach. There is also an area behind the beach that has been built on and is highly disturbed with an abundance of agricultural weeds.

The typical species present in the fixed dune at Lenankeel include: *Galium verum* (Lady's bedstraw), *Euphrasia officinalis* agg. (Eyebright), *Linum catharticum* (Fairy flax), *Plantago lanceolata* (Ribwort plantain), *Prunella vulgaris* (Selfheal), *Trifolium repens* (White clover), *Luzula campestris* (Field wood-rush), *Festuca rubra* (Red fescue) and *Lotus corniculatus* (Common bird's-foot trefoil).

Other species noted in the habitat are: *Ammophila arenaria* (Marram grass), *Daucus carota* (Wild carrot), *Poa* spp. (Meadow-grass) and *Ulex europaeus* (Gorse).

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

### **Mobile Dunes (H2120)**

The mobile dune habitat comprises 0.36ha (approximately 0.9%) of the total sand dune habitat at Lenankeel (Table 176A). The mobile dunes consist of a relatively narrow band of *A. arenaria*, which forms a steep ridge along most of the beach. This

is indicative of a previously eroded front. At the northern end of the beach the habitat is intact with accretion of sand and healthy growth of *A. arenaria* but at the southern end of the beach there is severe erosion and rock armour has been installed with a sea wall channelling a river out to sea. This would indicate that the system is eroding overall and the sand is simply being re-worked from one end of the beach to the other. There is a wooden walkway built from the access road and there is rock armour underneath this to keep it intact. There is a fence running along the top of the mobile dune ridge, which prevents access to walkers, therefore there is little erosion caused by recreation.

The typical species *Ammophila arenaria* (Marram grass) dominates the habitat with other species such as *Eryngium maritimum* (Sea-Holly), *Tussilago farfara* (Colt's-foot), *Festuca rubra* (Red fescue), *Carex arenaria* (Sand sedge), *Sonchus* spp. (Sow-thistle spp.) and *Daucus carota* (Wild carrot) also noted.

The negative indicator species *Cirsium arvense* (Creeping thistle) and *Senecio jacobaea* (Common ragwort) were noted in the habitat.

### **Perennial Vegetation of Stony Banks (H1220)**

Perennial vegetation of stony banks accounts for 0.009ha (approximately 0.023%) of the total sand dune habitat at Lenankeel (Table 176A). There is a band of unvegetated shingle to the front of the mobile dunes, which runs for most of the length of the beach. At the northern end of the beach the shingle is sparsely vegetated by both perennial and annual species. The area of the habitat is very small at present but may further build in the future. The main typical species present in the pioneer perennial vegetation was *Rumex crispus* (Curled dock), however as the habitat was so small no monitoring stops were carried out.

### **Annual Strandline (H1210)**

Strandline habitat comprises 0.045ha (approximately 0.011% of the total sand dune habitat) at Lenankeel (Table 176A). There are some patches of annual strandline habitat scattered along the shingle but a larger patch occurs at the northern end of the beach in association with the perennial vegetation. The habitat consists of the typical species *Atriplex prostrata* (Spear-leaved orache) and *Cakile maritima* (Sea rocket).

There were no negative indicator species noted in the habitat and as the area was deemed minimal no monitoring stops were carried out.

## **IMPACTS**

The main threats to the site are from development and agricultural practices. The current impacts on the sand dune habitats are given in Table 176B. There are a number of houses (Code 403) located along the main road (Code 502) to the beach which have individual fields (Code 150) associated with them. They are built at the access point to the site, which has led to a decrease in the extent of the machair and fixed dune habitats. The fields are individually managed. Some fields are grazed (Code 140) while others are left ungrazed (Code 149). There is some damage in the fields to the seaward side of the site, due to driving agricultural vehicles across the habitat (Code 190) and there is a high cover of agricultural weeds (Code 960). Amongst the dune ridges at the front of the fixed dune is evidence of old caravans, which have now been removed. However there is still some litter (Code 421) and dumped metal remnants associated with this area. There are also some dumped cars (Code 790) in some of the fields and some gorse bushes to the seaward side of the habitat. Overgrazing by rabbits (Code 146) was evident in the fixed dunes, near the hill, which is mainly composed of semi-fixed dune. Driving cars (Code 623) across the fixed dune grassland was also noted in one field.

The machair habitat is affected by a road (Code 502), which runs through the machair to a tarmacadam car park (Code 400) near the beach (in fixed dune). It has divided the habitat from a wetter flat plain to the landward side. The machair is also fenced (Code 150) and is no longer an open plain. Some of the fields may be improved (Code 103) and some ring feeders provide supplementary feed (Code 171) to the animals. Sheep and/or cattle graze the machair fields (Code 140), which is a positive influence on the habitat, as some areas are undergrazed (Code 149). There are also houses (Code 403) built along the road in the machair habitat.

The mobile dune is affected by natural erosion (Code 900), but at present does not seem to be too significant. There is a walkway (Code 530) from the car park to the

beach, which prevents further erosion of the habitat. A sea wall and rock armour (Code 871) are situated at the southern end of the beach.

The perennial vegetation of stony banks and strandline are prone to natural erosion (Code 900). Recreational pressure (Code 690) at present is relatively low at this site.

**Table 176B** Intensity and impact of various activities on sand dune habitats at Lenankeel

EU Habitat Code <sup>1</sup>	Activity Code <sup>2</sup>	Intensity <sup>3</sup>	Impact <sup>4</sup>	Area affected/ha	Location of Activity <sup>5</sup>
H21A0	103	B	-1	Unknown	Inside
H21A0	140	B	+2	20	Inside
H21A0	149	B	-1	7.1	Inside
H21A0	150	A	-1	Unknown	Inside
H21A0	403	A	-2	2.2	Inside
H21A0	502	A	-1	Unknown	Inside
H2130	140	B	+2	2	Inside
H2130	146	A	-1	1	Inside
H2130	149	B	-1	7	Inside
H2130	150	A	-1	3.8	Inside
H2130	190	B	-1	Unknown	Inside
H2130	400	A	-1	0.05	Inside
H2130	403	A	-2	1.5	Inside
H2130	421	A	-1	Unknown	Inside
H2130	502	A	-1	Unknown	Inside
H2130	623	C	-1	Unknown	Inside
H2130	790	B	-1	Unknown	Inside
H2130	960	A	-1	Unknown	Inside
H2120	530	C	+2	Unknown	Inside
H2120	871	A	-1	Unknown	Inside
H2120	900	C	0	Unknown	Inside
H1220	900	C	0	Unknown	Inside
H1210	900	C	0	Unknown	Inside
21BB	690	C	0	Unknown	Inside

<sup>1</sup>EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.

<sup>2</sup>Description of activity codes are found in Appendix 3

<sup>3</sup>Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.

<sup>4</sup>Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence

<sup>5</sup>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 assessed on the condition of the site with regards to extent, structure & functions and future prospects (Table 176C). The main source of baseline information for this site was from the NATURA 2000 report (1999) and the MPSU management plan (cSAC 2012, undated).

**Table 176C** Conservation status of Annex I sand dune habitats at Lenankeel

Habitat <sup>1</sup>	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system <sup>2</sup>
	Favourable	Unfavourable - Inadequate	Unfavourable - Bad		
<b>Machair (H21AO)</b>		Extent Structure & functions Future Prospects		<b>Unfavourable - Inadequate</b>	Unfavourable - Declining
<b>Fixed Dune (H2130)</b>		Extent Structure & functions Future Prospects		<b>Unfavourable - Inadequate</b>	Unfavourable - Declining
<b>Mobile Dunes (H2120)</b>	Extent	Future Prospects	Structure & functions	<b>Unfavourable - Bad</b>	Unfavourable - Declining

<sup>1</sup>EU Codes as per Interpretation Manual

<sup>2</sup>Ratings are Favourable (Enhanced, Maintained, Recovered, Declining), Unfavourable (Recovering, Unchanged, Declining) and Destroyed (Partially destroyed, Completely destroyed and Unknown)

Details of the numbers and pass/failure rates of monitoring stops used to assess habitat structure & functions at Lenankeel are shown in Table 176D.

### **Machair (H21AO)**

The machair habitat is relatively well represented at this site, however there has been some loss of extent as a result of the presence of a road and a number of houses. The extent of the machair is therefore considered to be *unfavourable-inadequate* at present. As the machair was not previously described at Lenankeel there is no mention of it in the NATURA 2000 report. Instead the report gives a ranking of *good representativity* for the habitat for the whole cSAC (2012).

The structure and functions parameter is rated as *unfavourable-inadequate*. A total of three monitoring stops were placed in the machair habitat. All passed their targets (Table 176D) and overall species diversity is relatively good. However as the machair has been fenced this has altered the structure of the habitat. The NATURA 2000

report ranks the machair within the cSAC as a whole as *average or partially degraded structure*.

**Table 176D** Pass/fail results of Annex I sand dune habitats at Lenankeel

Habitat	Monitoring stops		Conservation status
	Pass	Fail	
Machair (H21A0)	3	0	Unfavourable-inadequate*
Fixed Dunes (H2130)	1	0	Unfavourable-inadequate*
Mobile dunes (H2120)	2	2	Unfavourable-bad

\*Although the monitoring stop(s) passed conservation assessment based on best scientific judgement of the whole habitat

The future prospects of the machair are rated as *unfavourable-inadequate*. This assessment is based on the presence of a number of houses that have been built at the edge of the habitat and if development continues at the site the machair habitat will be under further threat. There is also the threat from certain agricultural practices, such as improvement and supplementary feeding, introducing agricultural grasses and weeds to the habitat. The NATURA 2000 report ranks the machair within the cSAC as a whole as *average or unfavourable prospects*.

An overall EU conservation status of *unfavourable-inadequate* is assigned to the machair (Table 176C).

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

### **Fixed Dunes (H2130)**

The fixed dunes cover a relatively small area at this site and there are a number of houses built within the habitat, which have decreased the overall area. The extent of the habitat is therefore rated as *unfavourable-inadequate*. The NATURA 2000 report does not specifically mention the fixed dunes at Lenankeel but states that for the Inishowen peninsula as a whole, fixed dunes are of *good representativity*. The report also points out that many of the fixed dune areas within the cSAC (2012) have been damaged by a variety of land-use practices in the recent past.

The structure and functions parameter is rated as *unfavourable-inadequate*. One monitoring stop was placed in the fixed dunes at the seaward side, as the rest of the habitat was not monitored due to access difficulties on the day of survey. Although

the monitoring stop passed it did not reflect the overall status of the habitat. Fencing has been carried out for grazing purposes and there is damage in some of the fixed dune fields. There are bare areas as a result of overgrazing by rabbits and some of the fields have a high cover of agricultural weeds. The NATURA 2000 report gives a ranking of *average or partially degraded structure*.

The future prospects of the fixed dune at Lenankeel are rated as *unfavourable-inadequate*. This assessment is based on the threat from development within the habitat and the alteration of areas as a result of farming practices. The NATURA 2000 report gives a ranking of *average or unfavourable prospects*.

An overall EU conservation status of *unfavourable-inadequate* is assigned to the fixed dune (Table 176C). This is attributable to the *unfavourable-inadequate* extent, structure and functions and future prospects of the habitat at this site.

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

### **Mobile Dunes (H2120)**

The extent of the mobile dunes at the site is considered to be *unfavourable-inadequate*. The habitat is relatively intact at present with little recreational activities however there has been some natural erosion at the southern end of the beach as this is an exposed site and the overall sand cell seems to be eroding. This will need further monitoring in the future.

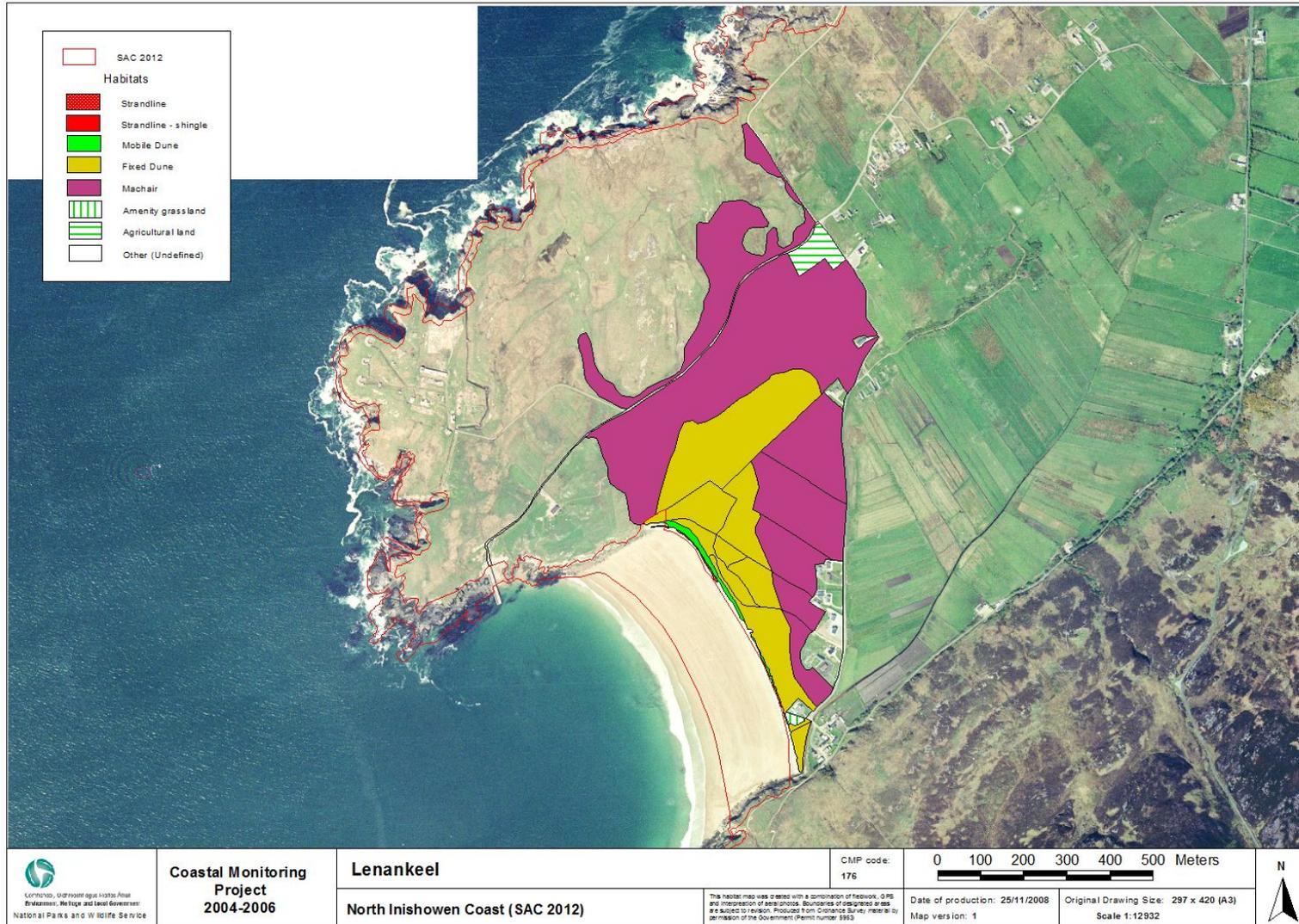
The mobile dunes located at the northern end of the beach are functioning well, with a high degree of sand accretion and healthy, green *Ammophila arenaria* (Marram grass). However the habitat decreases in condition towards the southern end of the beach and is absent altogether where there is rock armour. This area is obviously eroding and has altered the natural functioning of the habitat. Four monitoring stops were placed in the habitat, two of which passed and two failed the monitoring criteria. The two stops failed as a result of unhealthy *A. arenaria*, which accounted for >5% cover and there was >20% cover of agricultural weeds in one stop. Therefore an assessment of *unfavourable-bad* is assigned to the mobile dune habitat.

The future prospects of the habitat are rated as *unfavourable-inadequate*. The condition of the habitat is in decline and the presence of rock armour is affecting the natural build up of the habitat. Furthermore the overall sand system (cell) seems to be eroding and therefore re-working of sand from the southern end of the beach to the northern end may simply be occurring. If no new sand enters the system the mobile dunes will not have a chance to build further.

The overall EU assessment is rated as *unfavourable-bad* as a result of the *unfavourable-bad* structure and functions of the habitat. The overall Irish assessment is *unfavourable-declining*.

### **Perennial Vegetation of Stony Banks (H1220) & Strandline (H1210)**

No monitoring stops were carried out in the perennial vegetation of stony banks or in the strandline habitat, as they were deemed too small to monitor, therefore there is currently no conservation status assigned to these two habitats.



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

### **SITE DETAILS**

CMP06 site name: **Tullagh**    CMP06 site code: **177**    CMP Map No.: **175**

County: **Donegal**            Discovery map: **3**            Grid Reference: **C 355 483**

6 inch Map No.: **Dg 003 & 010**

Aerial photographs (2000 series): **O 0017-D; O 0018-C; O 0030-B; O 0031-A**

NPWS Site Name: **North Inishowen Coast**

NPWS designation:    pNHA: **2012**    cSAC: **2012**    SPA: **4034 (adjacent)**

Ranger Area: **Donegal**

MPSU Plan: **Draft 2 – Short Format (undated)**

Report Author: **Tim Ryle**

### **SITE DESCRIPTION**

Tullagh machair and sand dunes are located on the northwest shore of the Inishowen peninsula, approximately 2.5km west of Ballyliffin. Nestled in the relative shelter of Tullagh Bay, the site extends between Tullagh Point to the west and Suil Point to the East, a distance of approximately 2.1 kilometres. The area is a popular destination with holidaymakers. Houses have been developed along the road and a number of caravan parks are situated on the leeward side of the dune ridge. The beach is easily accessed at a number of points along the public road to the south. As a result of the popularity of the area, however, the dune system is greatly reduced in extent and condition over the years.

Tullagh is one of seven sand dune sites included in the North Inishowen Coast candidate Special Area of Conservation (cSAC 2012). The other sites include

- Crummies Bay (CMP 175)
- Lenankeel (CMP176)
- Doagh Isle (CPM 178)
- Lag (CMP 179),
- White Strand (CMP 180)

- Culdaff (CMP 181)

The Annex I habitats for which the cSAC was selected include the priority habitats Machair (H21A0) and Fixed dunes with herbaceous vegetation (H2130), along with Vegetated sea cliffs of the Atlantic and Baltic coasts, Perennial vegetation of Stony Banks, Mudflats and sandflats not covered by seawater at low tide and Dry heath.

A number of noteworthy plant species have been recorded from the peninsula in the past. These include *Ligusticum scoticum* (Scots lovage), *Vicia lathyroides* (Spring vetch) and *Silene acaulis* (Moss campion). The NATURA 2000 database also lists the presence the scarce *Saxifraga oppositifolia* (Purple saxifrage), whilst *Crambe maritima* (Sea kale) was last recorded in 1836. A small population of *Mertensia maritima* (Oyster plant) is known from shingle habitat north of Tullagh sand dunes. It was documented during the shingle survey 1999 (Moore and Wilson, 1999). It was not extensively searched for during the current survey, as its recorded position is some distance removed from the sand dune habitat.

A large part of the site including Trawbrea Bay to the East of Tullagh Bay is also designated as a Special Protection Area (SPA 4034) owing to the diversity of coastal habitats. There is a corresponding diversity of birds throughout, from waders and wildfowl, to cliff dwellers. Some of the notable birds include *Branta leucopsis* (Barnacle Goose), *Falco peregrinus* (Peregrine falcon) and *Pyrhocorax pyrrhocorax* (Chough). The NATURA 2000 database lists a good number of other notable species including seabirds, although it cautions that the findings are out of date.

Table 177A lists the area of sand dune habitats that were recorded from Tullagh during the 2006 survey. Other areas or vegetation types that were recorded in association with the sand dunes include:

- a) small patches of scrub dominated by (*Ulex europaeus*) (0.217ha)
- b) Saltmarsh (0.376ha)
- c) Amenity grassland largely caravan parks and reseeded gardens (3.877ha)
- d) Agricultural grassland - a derelict vegetable plot (0.178ha)
- e) Undefined – areas that have been altered or managed, or are no longer considered to support sand dune habitat (11.379ha)

Storm beaches and shingle deposits are well represented in a number of areas throughout the cSAC. Although individual species typical of perennial vegetation of stony banks were recorded from the site, no appreciable habitat was found in close association with the sand dune habitats. In keeping with all other sites, however, the presence of unvegetated shingle/cobble is illustrated on the maps. Vegetated cobble, however, extends further north around Tullagh Point, while a smaller area was noted from the eastern side of Suil Point. These were surveyed in 1999 as part of the shingle survey (Moore and Wilson, 1999).

**Table 177A** Areas of EU Annex I habitats mapped at Tullagh

EU Code	EU Habitat	Area (ha)
H2110	Embryonic shifting dunes	0.220
H2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i>	4.124
H2130	Fixed coastal dunes with herbaceous vegetation	30.844
H21A0	Machair	20.282
	<b>Total Sand dune</b>	<b>55.470</b>
	<b>Other undefined Habitats (on sandy substrates)</b>	<b>5.166</b>
	<b>Potential Sand dune Habitat</b>	<b>60.636</b>

### **Machair (H21A0)**

The machair has been greatly reduced in extent and condition over the years, largely as a result of agricultural improvement, but also as a result of the development of houses and caravan parks. The machair is now largely confined to the western end of the site, around Tullagh Point and remnant patches are also found in low-lying fields behind the dune ridge. In total, approximately 20.282ha (Table 177A) of machair grassland is mapped, although a significant portion (approximately 90%) of this is agriculturally improved and ecologically degraded.

The condition of the machair is generally poor and all three monitoring stops failed on species diversity and at least one other target, either the presence of negative indicator species or on sward height. The typical species that were recorded included *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Plantago lanceolata* (Ribwort plantain), *Trifolium repens* (White clover) and *Lotus corniculatus* (Birds-foot trefoil).

The relative abundance of species such *Trifolium pratense* (Red clover) along with negative indicator species such as *Senecio jacobaea* (Common ragwort), *Cirsium*

*arvense* (Creeping thistle), *Lolium perenne* (Perennial ryegrass) and *Cynosurus cristatus* (Crested dog's tail) are indicative of the agricultural management of the remnant machair system.

All of the machair is divided into plots by fences and grazed to varying intensities by cattle. One area (monitoring stop 2) was very improved and only had 4 species, namely *Festuca rubra* (Red fescue), *Trifolium pratense* (Red clover), *Poa pratensis* (Smooth meadow grass) and *Agrostis* sp. (Bent grass).

### **Fixed Dunes (H2130)**

Fixed dunes are widely distributed throughout the cSAC. Descriptions of Tullagh Strand, however, are overlooked by most of the NPWS literature. The condition of the fixed dunes at Tullagh has been greatly altered through a variety of ongoing land-use practices. It is severely under pressure from the development of holiday homes and caravan parks. And though much of the remaining dune grassland has been modified through intensive grazing regimes, a narrow band of relatively rank fixed dune vegetation persists along the front of the dune system. In total, it is estimated to occupy an area of 30.844ha (Table 177A).

The dominant plant species are *Ammophila arenaria* (Marram) and *Festuca rubra* (Red fescue) accompanied by *Carex arenaria* (Sand sedge), *Lotus corniculatus* (Birds-foot trefoil), *Galium verum* (Lady's bedstraw), *Plantago lanceolata* (Ribwort plantain), *Trifolium repens* & *Trifolium pratense* (White & Red clover). Species that were less abundant, though still widespread included *Thymus polytrichus* (Thyme), *Bellis perennis* (Daisy) and *Cerastium fontanum* (Common mouse-ear). Bryophyte cover was well developed with the most frequently recorded species being *Rhytidiadelphus squarrosus* & *Rhytidiadelphus triquetrus*.

The widespread presence of negative indicator species such as *Senecio jacobaea* & *Senecio vulgaris* (Common ragwort & Groundsel) are indicative of the pressure of agricultural practices. Other negative species include broadleaf grasses such as *Lolium perenne* (Perennial ryegrass), *Poa pratensis* (Smooth meadow-grass), *Dactylis glomerata* (Cocksfoot), and garden escapees such as *Tritonia X crocosmiflora* (Montbretia), *Rubus fruticosus* agg. (Bramble) and *Ligustrum vulgare* (Privet).

### **Mobile Dunes (H2120)**

Mobile dunes are recorded as a narrow strip at the front of the eroding face of the dune ridge along the western half of the site. The majority of mobile dune habitat is recorded from the eastern end of the Tullagh Bay, where there has been considerable accumulation of sand. Characterised by *Ammophila arenaria* (Marram) and *Elytrigia juncea* (Sand couch), other species that were infrequently recorded include *Taraxacum officinale* agg. (Dandelion) and the negative indicator species *Cirsium arvense* (Common thistle) and *Senecio jacobaea* (Common ragwort), although these were not frequent and were largely associated with access tracks to the strand.

### **Embryonic Dunes (H2110)**

The distribution of foredunes was confined to the eastern end of the site, where fresh sand has accumulated. Although not extensive, they occupied an area estimated at 0.220ha (Table 177A). The vegetation was largely characterised by the presence of *Elytrigia juncea* (Sand couch), although other occasional occurrences included *Ammophila arenaria* (Marram), *Honckenya peploides* (Sea sandwort) and *Carex arenaria* (Sand sedge). Another species of limited distribution was *Leymus arenarius* (Lyme grass), which extended, in places, across boundaries into the mobile dunes.

### **Shingle Vegetation (H1220)**

Raised beaches are known from a number of locations around the North Inishowen peninsula and have previously been surveyed as part of the NPWS shingle survey (Moore and Wilson, 1999).

Despite considerable deposits of shingle/cobble around the headlands at either end of Tullagh Bay, perennial vegetation of stony banks is not recorded as a habitat from the site. Typical species that are associated with the habitat were infrequently recorded and included *Tripleurospermum maritimum* (Sea mayweed), *Honckenya peploides* (Sea sandwort), *Rumex crispus* (Curled dock), *Galium aparine* (Cleavers) and *Atriplex glabriuscula* (Babington's orache), while a single patch of *Beta vulgaris* ssp. *maritima* (Sea beet) was noted from cobble on Suil point.

The legally protected *Mertensia maritima* (Oyster plant) which is known from Rockstown Harbour, Tullagh Point and Culoort) was not relocated, although its last known location at Tullagh Point is some distance removed from the sand dune system.

### **Annual Strandline (H1210)**

The strand at Tullagh is for the most part sandy, although shingle and pebble have been washed up in places. Although it was not originally listed as a qualifying habitat for the cSAC, the supplemental explanatory notes for the NATURA 2000 data form suggest the likely occurrence of annual vegetation of drift lines, on the basis of the large number of sandy beaches present throughout the site.

Species indicative of the habitat, namely *Cakile maritima* (Sea rocket) and *Honckenya peploides* (Sea sandwort), with minor amounts of *Elytrigia juncea* (Sand couch) were recorded. However, the abundance was so low that no habitat is mapped at the site.

### **IMPACTS**

Activities observed or known to be impacting on the sand dune habitats at Tullagh are shown in Table 177B. Much of the machair plain has been impacted through agricultural and development and is now only a remnant of a once larger system. Although the machair plain extends beyond the boundary of the cSAC, the majority of the listed impacts occur in sand dune habitat located inside the cSAC.

Restructuring of the land holding is an obvious feature of the machair plain (code 150). Although there is no information concerning if it had commenced prior to the designation of the site as a cSAC, many of the fences were not of recent installation. Grazing (code 140) is an intensive feature of the remnant machair plain and large parts of the fixed dune habitat towards the eastern perimeter of the caravan parks. Sheep and cattle graze the machair, while cattle were the main grazing animals in the sandy fields on the eastern half of the site, while supplemental feeders were observed in a number of places. Grazing intensity is relatively high on the sandy fields, which reflects the fact that much of the land machair hinterland is damp and indeed the peaty soils were obviously waterlogged and heavily poached in places.

Although much of the machair system has been impacted through agricultural practices, Much of the dune grassland at the eastern end of the site that is not fenced off for agricultural or amenity purposes would benefit from an increased grazing regime. The sand covered rocky headland to the extreme east of the site is undergrazed (code 149) and bracken is spreading through the rank, Marram-dominated fixed dune vegetation.

**Table 177B** Intensity and impact of various activities on sand dune habitats at Tullagh

EU Habitat Code <sup>1</sup>	Activity Code <sup>2</sup>	Intensity <sup>3</sup>	Impact <sup>4</sup>	Area affected/ha	Location of Activity <sup>5</sup>
H21A0	140	A	-1	13	Inside
H2130	140	A	-1	6	Inside
H2130	149	A	-1	7.5	Inside
H21A0	150	A	-1	Unknown	Inside
H2130	180	C	-1	<0.1	Inside
H21BB	302	C	-1	<0.1	Inside
H2130	401	A	-1	0.4	Inside
H2130	608	A	-1	1.2	Inside
H2130	608	A	-1	2.5	Outside
H2130	622	B	0	<1	Inside
H2120	622	A	-1	1	Inside
H21BB	623	B	-1	Unknown	Inside
H2130	790	C	-1	<1	Inside
H2120	790	C	-1	<1	Inside
H21A0	900	B	0	Unknown	Inside
H2130	900	B	0	Unknown	Inside
H2120	900	A	0	Unknown	Inside
H2110	900	A	0	Unknown	Inside
H2130	954	C	-1	3.128	Inside

<sup>1</sup>EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.

<sup>2</sup> Description of activity codes are found in Appendix 3

<sup>3</sup> Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.

<sup>4</sup> Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence

<sup>5</sup> 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

Some parts of the site are relatively (though not entirely) inaccessible to grazing animals. The isolated fixed dunes around Suil Point at the extreme eastern end of the site are maturing would benefit from an increased grazing regime (code 149). The spread of the invasive species (code 954), *Pteridium aquilinum* (Bracken) is happening to the gradual detriment of the fixed dunes.

Continuous urbanisation (code 401) has seen many new houses built along the road. Although many of these developments are outside the cSAC boundary, the gardens associated with them extend to the frontline of the dunes. Indeed, some have levelled

the dune grassland in places stripping the sward and reseeded with grass mixtures dominated by *Poa* spp. (Meadow-grass) and *Lolium perenne* (Perennial ryegrass). This loss of habitat continues.

There are accounts in the NHA report and again in the management plan that the removal of beach material (code 302) – shingle and sand, was a problem at a number of areas on the North Inishowen Peninsula. Although this is prohibited by law, and is also classified as a notifiable action in terms of conservation sites, evidence of this activity was observed at Tullagh. The removal of gravel was recorded from at least one area on the beach, while the historical extraction of sand from within a machair was observed on the northern end of the site. Owing to the number of dwellings that were under construction, it is not surprising that sand had been collected from the beach.

The site is popular with visitors and there are a number of recreational activities that are having an impact on the sand dune system. There has been an increase in the number of cars and other motorised vehicles (code 623) using the general area. Although the County Council has designated a metalled car park at the southern end of the site, another car park is located at the northern end of the site on the dune grassland. Quad bikes were seen scrambling along the front of the dune system, and trails through the accumulating dunes at the south of the system indicate that is an established activity.

A number of caravan /mobile home parks (code 608) have been developed in the area and comparison of the year 2000 aerial photograph with the 2006 survey indicates that there has been an expansion of some of the caravan parks, or at least additional land has been acquired to facilitate more caravans.

Walkers and other users of the beach (code 622) can access the beach at a number of locations along the length of the beach. While their influence is not having a significant impact on the dune systems compared with other activities in the locality, the increasing numbers of people that visit the site will over time impact on the dunes.

A number of burnt areas (code 180) were noted during the 2006 survey. Invariably it was areas dominated by the Marram. While some of the burning may have been unintentional and related to BBQ's etc, one area fronting a newly installed garden fence had been cleared of vegetative cover. In general, littering (code 790) was not significant except around the car parks and along the parts of the tracks that lead from the caravan parks onto the strand.

While natural erosion (code 900) is a feature of the site, it is unwise to suggest that it affects all parts of the beach equally. There are obvious signs of erosion towards the western end of the site, and the fixed dunes around Tullagh Point are scoured by the tidal cycle. Further east, however, this is not the case and a large accumulation of fresh, shifting sand has built up.

## **CONSERVATION STATUS**

The overall conservation status assessment of each habitat at Tullagh is based on a combination of *Habitat Extent, Structure & Functions*, and *Future Prospects* assessments (Table 177C). Baseline information for Tullagh largely consisted of NPWS documentation. While the NHA information for this large composite site (North Inishowen Coast) is inadequate, some information is contained in the NATURA 2000 reports and the draft management plan. However, its comparative value is limited owing to the variance of the reports. For example, while fixed dunes are recognised as an important habitat selected for the cSAC, the management plan has no vegetative description of fixed dunes at Tullagh.

### **Machair (H21A0)**

Though the machair plain would have previously encompassed a far greater area, there are no estimates as to its former extent prior to designation of the site. Comparisons between the aerial photographs (year 2000) and the findings of the present survey would suggest that there hasn't been any great loss of habitat. Therefore extent is rated as *favourable* (Table 177C).

Although machair is shown to occupy a relatively large area of the site (Map 175), much of it is fenced off and is not easily accessible. For this reason, only three monitoring stops were carried out. All three monitoring stops failed on a number of

targets (Table 177D), namely species diversity, sward height and the presence of negative indicator species. This was indicative of the reduction in the condition or quality of the habitat, owing to the expansion of domestic and tourist residence/facilities and land use associated with agricultural management. Therefore the structure and functions of the habitat is rated as *unfavourable-bad*.

**Table 177C** Conservation status of Annex I sand dune habitats at Tullagh

Habitat <sup>1</sup>	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system <sup>2</sup>
	Favourable	Unfavourable - Inadequate	Unfavourable - Bad		
<b>Machair (H21A0)</b>	Extent	Future Prospects	Structure & Functions	Unfavourable - Bad	Destroyed - Partially Destroyed
<b>Fixed Dunes (H2130)</b>	Extent / Structure & Functions	Future Prospects		Unfavourable - Inadequate	Unfavourable - Declining
<b>Mobile Dunes (H2120)</b>	Extent / Structure & Functions / Future Prospects			Favourable	Favourable e-Maintained
<b>Embryonic Dunes (H2110)</b>	Extent / Structure & Functions* / Future Prospects			Favourable	Favourable - Maintained

<sup>1</sup>EU Codes as per Interpretation Manual

<sup>2</sup>Ratings are Favourable (Enhanced, Maintained, Recovered, Declining), Unfavourable (Recovering, Unchanged, Declining) and Destroyed (Partially destroyed, Completely destroyed and Unknown)

\*Structure and function assessment is based on Best Scientific Judgement

Under the current regime the short-term prospects of the machair habitat are *unfavourable-inadequate* (Table 177C), and this is unlikely to change unless there is a radical change in the management and stocking levels.

Overall, the EU conservation status assessment for the machair at Tullagh is automatically rated as *unfavourable-bad*, by virtue of the fact that the structure and functions attribute failed. The corresponding Irish rating is *destroyed-partially destroyed* (Table 177C).

### **Fixed Dunes (H2130)**

Despite the pressures of tourist and recreational activities, the fixed dunes are still relatively widespread at Tullagh and are found along as a narrow band along the front

of the system. The extent is rated as *favourable* (Table 177C), although it should be noted that there is very little quantitative information to discern if there has been a significant reduction in extent since the site was proposed for designation.

The structure and functions of the habitat are *favourable* and all seven monitoring stops passed (Table 177D). Surprisingly, the monitoring stops were representative of the habitat which was largely rank in nature and heavily impacted by development and recreational pressures.

The future prospects are downgraded to *unfavourable-inadequate* (Table 177C), however, on the basis of the ongoing degradation of the habitat and continuing pressures (recreational and agricultural) to develop the land.

The overall conservation status assessment for the fixed dunes habitat at Tullagh is *unfavourable-inadequate*. This equates with an *unfavourable-declining* rating under the Irish conservation assessment system and reflects the general decline in the quality of the habitat (Table 177C).

**Table 177D** Pass/Fail results of monitoring stops for Annex I sand dune habitats at Tullagh

Habitat	Monitoring stops		Conservation status
	Pass	Fail	
Machair (H21A0)	0	3	Unfavourable - Bad
Fixed Dunes (H2130)	7	0	Favourable
Mobile Dunes (H2120)	5	0	Favourable

### Mobile Dunes (H2120)

There are no mobile dunes at the western end of the rocky strand, although this would be expected as there is little input of fresh sand here. Continuing eastwards, however, along the beach, there is a gradual increase until at their greatest width the mobile dunes are approximately 50metres wide. Therefore the extent is rated as *favourable*.

The pass/failure rates of monitoring stops used to assess habitat structure & functions are shown in Table 177D. All five monitoring stops passed for the mobile dunes and therefore are rated as *favourable*.

Although much of the western half of the site is characterised as eroding dune face, there is considerable accumulation of sediment towards the eastern end of the site. The volume of sand is such that the future prospects for the mobile dunes are considered *favourable* (Table 177C).

As the three parameters of the conservation status are *favourable*, the overall conservation assessment for the mobile dunes at Tullagh is *favourable*. The corresponding Irish conservation assessment is *favourable-maintained* (Table 177C).

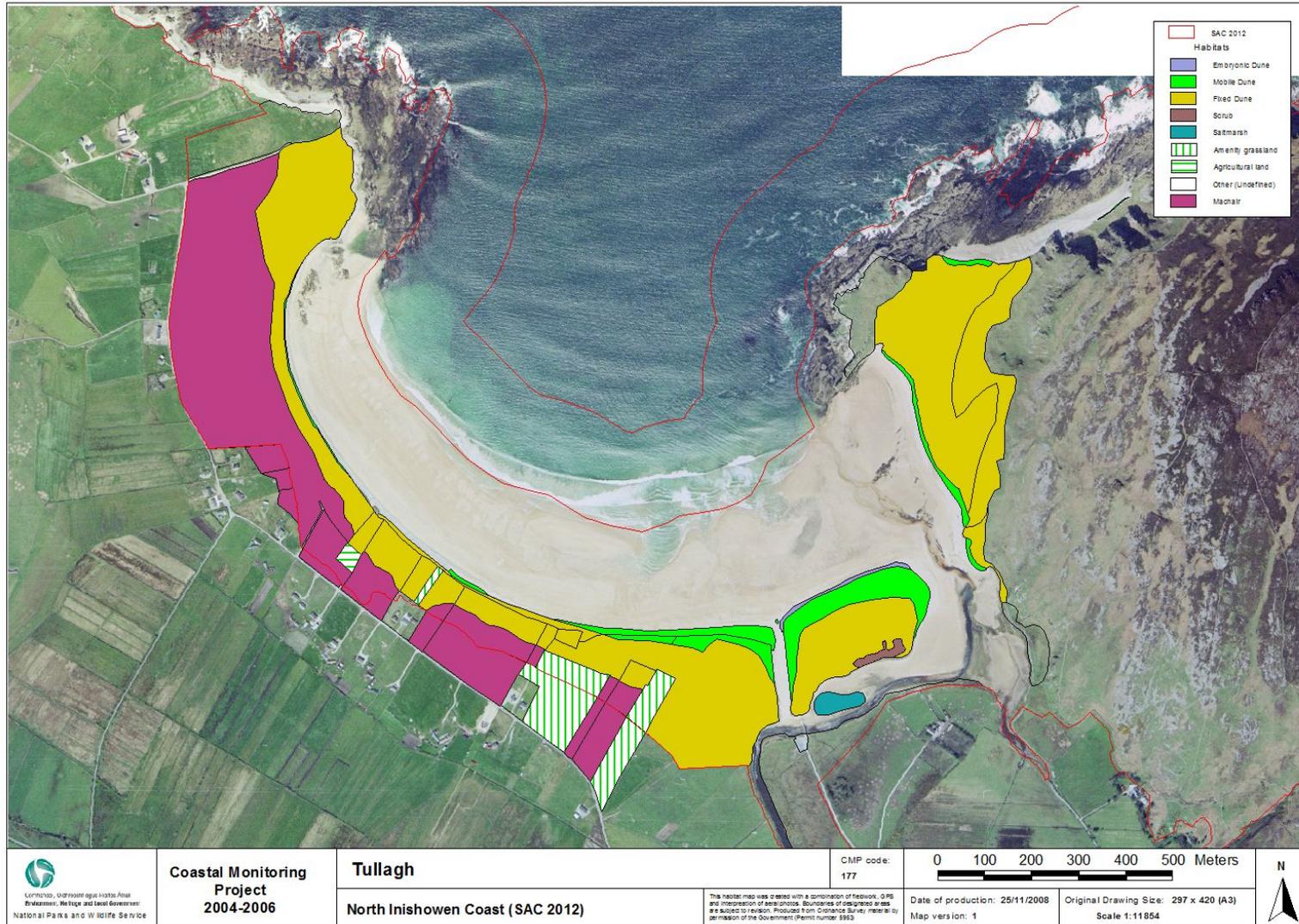
### **Embryonic Dunes (H2110)**

The development of foredunes is greatly hindered on the west of Ireland by the rugged nature of the coastline and the supply of sediment. Although not as widespread as the mobile dunes, the foredunes are found at the eastern end of the site where they are showing signs of increasing. The extent is rated as *favourable*.

Monitoring stops were not carried out in the habitat owing to the relative extent of, and the homogenous condition of the vegetation. The overwhelming dominance and vigour of the typical species that was noted suggest a *favourable* (Table 177C) rating for the structure and functions.

The future prospects for the foredune community appear to be *favourable*, as there is considerable accumulation of fresh sand at the eastern half of the site and the foredunes are showing signs of expansion (Table 177C).

The EU conservation assessment is *favourable* for the embryonic dunes at Tullagh, as they satisfy the three criteria of conservation status. Under the proposed Irish assessment scheme, that is analogous to *favourable-maintained* (Table 177C).



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

### SITE DETAILS

CMP06 site name: **Doagh Isle** CMP06 site code: **178** CMP Map No.: **176**

County: **Donegal** Discovery map: **3** Grid Reference: **C 395 505**

6 inch Map No.: **Do 3 & 4**

Aerial photographs (2000 series): **O 0011 D; O 0012A,C,D; O 0018 B,D;**

**O 0019 A,B,C**

NPWS Site Name: **North Inishowen Coast**

NPWS designation: **pNHA: 2012 cSAC: 2012**

Ranger Area: **Donegal**

MPSU Plan: **Draft II**

Report Author: **Anne Murray**

### SITE DESCRIPTION

Doagh Isle sand dune and machair system is part of North Inishowen Coast cSAC. The cSAC comprises approximately 45km of coastline around the Inishowen Peninsula in County Donegal. The cSAC includes a diversity of habitats including sand dune, machair, saltmarsh, mud and sandflats, rocky cliffs, low rocky shores, sandy and shingle beaches, heath, wet and dry grassland and semi-natural woodland.

The diversity of coastal habitats within the site has resulted in a high diversity of bird species. Trawbreaga Bay SPA, for example is recognised as an internationally important overwintering site for the Annex I bird species - Barnacle Geese (*Branta leucopsis*). Other Annex I bird species recorded in the SPA include, Great Northern Diver (*Gavia immer*), Whooper Swan (*Cygnus Cygnus*) and Bar-tailed Godwit (*Limosa lapponica*). Chough (*Pyrrhocorax pyrrhocorax*) nest on the cliffs within the cSAC and use grasslands (including those at Doagh Isle) for foraging. Common (*Sterna hirundo*), Arctic (*Sterna paradisaea*) and Little Terns (*Sterna albifrons*) have nested at Doagh Isle in the past.

The cSAC is designated for the Annex I sand dune habitats, Machair (priority), Fixed dunes (priority) and Perennial vegetation of stony banks. Other Annex I habitats for which it is designated are, Mudflats and sandflats not covered by seawater at low tide and Dry heath.

Doagh Isle is situated along the northwestern edge of the Inishowen Peninsula, just south of Malin Head. The site contains the most extensive areas of machair and fixed dunes that occur within the cSAC. However, part of the fixed dune area has been modified due to the presence of a golf course. The fixed dunes and machair cover the western section of Doagh Isle, while the eastern section comprises improved agricultural fields and rock outcrops. The fixed dunes are low lying in the south where they front a flat area of machair at the townland of Ardagh, heading northwards they occur on higher ground in a mosaic with outcropping rock at Carrackabraghy. Large cobble ridges (vegetated in places) fringe the fixed dunes at Pollan Beach, while further north the dunes are edged by rocky shores and cliff.

Machair occurs at the neck of Doagh Isle, on the southern side of the fixed dunes, it is bounded by a channel on the landward side and grades into wet semi-improved fields. All of the machair is striped and improved to some extent.

The sand dune habitats recorded at Doagh Isle during this survey are Machair, Fixed dunes, Dune slack, Mobile dunes, Embryonic dunes, Perennial vegetation of stony banks and Annual vegetation of driftlines. The total sand dune area comprises 427.334ha (excluding the golf course).

**Table 178A** Areas of EU Annex I habitats mapped at Doagh Isle

EU Code	EU Habitat	Area (ha)
H1210	Annual vegetation of driftlines	0.102
H1220	Perennial vegetation of stony banks	1.206
H2110	Embryonic shifting dunes	0.065
H2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i>	0.771
H2130	Fixed coastal dunes with herbaceous vegetation	335.828*
H2190	Humid Dune Slacks	6.848
H21A0	Machair	92.516**
	<b>Total sand dune excluding developments/modifications</b>	<b>427.334</b>
	<b>Total sand dune including developments/modifications</b>	<b>591.449</b>

\* Approximately 10ha of semi-fixed dunes within the cSAC appears to be within the golf course fenceline

\*\* Approximately 4ha of machair within the cSAC is used as a practice range for the golf course

The golf course occupies 146ha of fixed dunes, which has been excluded from the cSAC. However, a band of 10ha of golf course along the seaward edge of the fixed dunes appears to be in the cSAC. A practice range is located in the machair within the cSAC southeast of the main entrance to the golf course. Parts of the machair have been improved for agriculture covering approximately 20ha and are now excluded from the cSAC.

### **Machair (H21A0)**

The machair at Doagh Isle is located in the south of the site adjacent to the golf course and comprises wet and dry machair grassland. The machair is striped and overgrazed by sheep, cattle and rabbits. Common ragwort (*Senecio jacobaea*) is abundant throughout. Rabbit burrows are common and have undermined the machair structure. Natural erosion has been exacerbated by a combination of overgrazing, rabbit burrowing and sand extraction. Dumping of household items is also evident. The total machair area comprises 92.516ha (excluding areas that have been improved) (Table 178A).

There is a relatively poor diversity of machair species in the dry machair grassland at Doagh Isle and the typical species include: *Achillea millefolium* (Yarrow), *Bellis perennis* (Daisy), *Carex arenaria* (Sand sedge), *Cerastium fontanum* (Common mouse-ear), *Euphrasia officinalis* agg. (Eyebright), *Galium verum* (Lady's bedstraw), *Linum catharticum* (Fairy flax), *Lotus corniculatus* (Common bird's-foot-trefoil), *Plantago lanceolata* (Ribwort plantain) and *Trifolium repens* (White clover). The mosses *Calliergonella cuspidata*, *Homalothecium lutescens*, and *Rhytidiadelphus squarrosus* are common in the machair.

Areas of wet machair mainly in the east of the habitat, that are tightly but not overgrazed, contain a greater diversity of species with additional typical wet machair species including; *Anagallis tenella* (Bog pimpernel), *Agrostis stolonifera* (Creeping bent), *Carex flacca* (Glaucous sedge), *Carex nigra* (Common sedge), *Hydrocotyle vulgaris* (Marsh pennywort), *Mentha aquatica* (Water mint), *Potentilla anserina* (Silverweed) and *Prunella vulgaris* (Selfheal). Mosses present include *Climacium dendriodes*, *Hylocomium splendens* and *Plagiomnium undulatum*.

Other species present in the wet and dry machair include: *Festuca rubra* (Red fescue), *Cynosurus cristatus* (Crested dog's-tail), *Holcus lanatus* (Yorkshire fog), *Poa* spp. (Meadow grass spp.) and *Ranunculus* spp. (Buttercup spp.).

The negative indicator species *Senecio jacobaea* (Common ragwort) is present throughout the machair and covers at least 15% of the overall habitat. Curled dock (*Rumex crispus*) also occurs in the machair but is not common.

### **Fixed Dunes (H2130)**

The fixed dunes are the main sand dune habitat (79% of the total) at Doagh Isle covering 335.828ha (Table 178A). A large portion of the fixed dunes have been taken over by the golf course. The remainder of the fixed dunes overlies rock in the northern part of Doagh Isle, with a smaller area of lowlying dunes to the south of the golf course. All of the fixed dune area in the north is fenced into fields and is tightly grazed by sheep, cattle and rabbits. The fixed dunes associated with the machair in the southwestern part of the site are in very poor condition. They are intensively managed in striped fields along with the machair and are impacted by the same activities i.e. overgrazing, rabbit burrowing and invasion by agricultural weeds.

The fixed dunes species recorded at Doagh Isle include *Carex arenaria* (Sand sedge), *Campanula rotundifolia* (Harebell), *Cerastium fontanum* (Common mouse-ear), *Euphrasia officinalis* agg. (Eyebright), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Luzula campestris* (Field wood-rush), *Lotus corniculatus* (Common bird's-foot-trefoil), *Pilosella officinarum* (Mouse-ear hawkweed), *Plantago lanceolata* (Ribwort plantain), *Primula* spp. (Primrose spp.), *Prunella vulgaris* (Selfheal), *Taraxacum* agg. (Dandelion), *Thymus polytrichus* (Wild thyme), *Trifolium repens* (White clover), *Veronica chamaedrys* (Germander speedwell), *Viola tricolor* subsp. *curtisii* (Wild pansy), *Peltigera* spp., *Tortula ruraliformis*, *Rhytidiadelphus squarrosus* and *Rhytidiadelphus triquetrus*.

Marram grass (*Ammophila arenaria*) is common on the more mobile sands around rock outcrops in the northern part of the fixed dunes.

The negative indicator species *Senecio jacobaea* (Common ragwort), *Cirsium arvense* (Creeping thistle) and *Lolium perenne* (Perennial rye-grass) are common throughout the fixed dunes.

### **Dune Slacks (H2190)**

A large area of dune slack comprising 7ha occurs in the fixed dunes directly north of the golf course. The slack is grazed by sheep and shows signs of enrichment, with agricultural weeds abundant throughout. The dune slack area appears to be drying out and fixed dune species are common in this habitat.

The typical species that occur in the slack are *Hydrocotyle vulgaris* (Marsh pennywort), *Juncus articulatus* (Jointed rush), *Potentilla anserina* (Silverweed), *Prunella vulgaris* (Selfheal), *Ranunculus bulbosus* (Bulbous buttercup), and the moss - *Calliergonella cuspidata*.

Other species present include, *Agrostis stolonifera* (Creeping bent), *Anacamptis pyramidalis* (Pyramidal orchid), *Bellis perennis* (Daisy), *Carex flacca* (Glaucous sedge), *Centaureum erythraea* (Common centaury), *Cynosurus cristatus* (Crested dog's-tail), *Euphrasia officinalis* agg. (Eyebright), *Festuca rubra* (Red fescue), *Holcus lanatus* (Yorkshire fog), *Linum catharticum* (Fairy flax), *Samolus valerandi* (Brookweed) and *Trifolium repens* (White clover).

The negative indicator species *Senecio jacobaea* (Common ragwort) and *Cirsium arvense* (Creeping thistle) are common in the dune slack.

### **Mobile Dunes (H2120)**

The mobile dune comprises 0.771ha and includes patches of *Ammophila arenaria* (Marram grass) scattered along the coastline of Doagh Isle. A very narrow band of intact mobile dune habitat fringes the fixed dune at Lagacurry in the northeast of the site. The mobile dune is dominated by the typical species *Ammophila arenaria* (Marram grass) and also contains the negative indicator species *Cirsium arvense* (Creeping thistle).

### **Embryonic Dunes (H2110)**

A thin band of embryonic habitat fronts the mobile zone at Lagacurry and covers a very small area of 0.065ha. The typical species *Elytrigia juncea* (Sand couch) dominates with the annual *Cakile maritima* (Sea rocket) present also. There are no negative indicator species recorded in this habitat.

### **Perennial vegetation of stony banks (H1220)**

A wide and tall (6m) ridge of cobble (fronted by a lower sandy beach) stretches the length of Pollan Bay. It provides significant natural protection to the land it borders including the dunes and golf course. The cobble is vegetated on the sheltered landward side of the ridge where conditions are more stable and the cobble is less mobile. The total area of this habitat is 1.206ha.

The typical species of pioneer vegetation of stony banks present include; *Honckenya peploides* (Sea sandwort), *Rumex crispus* (Curled dock), *Sonchus arvensis* (Perennial sow-thistle) and *Tripleurospermum maritimum* (Scentless mayweed).

No negative indicator species were recorded on the cobble habitat and there are no manmade structures impeding the natural movement of the cobble beach.

### **Annual Strandline (H1210)**

A small patch of annual vegetation comprising 0.102ha occurs at the main access point in the south of the site at Pollan Bay. The vegetation has developed on sand deposited over the upper cobble beach from the eroded access track. The annual species include *Atriplex* spp. (Orache spp.), *Cakile maritima* (Sea rocket) and *Honckenya peploides* (Sea sandwort).

## **IMPACTS**

The activities impacting on the sand dunes and machair at Doagh Isle are given in Table 178B. These are mainly agricultural activities. The impact of low-level grazing (code 140) has been positive in parts of the site, most notably in the eastern part of the machair and small areas of the fixed dunes. However, overgrazing mainly by sheep and rabbits (code 142 and 146) has impacted the greatest part of the machair, fixed dunes and dune slack. Rabbit burrowing has also had a negative impact on the

structure of the dunes. All of the dune area is fenced into fields (code 150), which has concentrated agricultural activities and agricultural improvement (code 103). The invasion of agricultural weeds (code 954) is evident throughout the site. Undergrazing (code 149) affects a small area of fixed dune and machair at Doagh Isle.

The presence of Ballyliffen Golf course (code 601) has directly affected part of the machair within the cSAC which is used as a practice range. An area of the golf course along the seaward edge comprising fixed dune appears to lie within the cSAC. It is unclear if this is a previous boundary mapping error or if the golf course is expanding. The dune slack on the northeastern edge of the golf course is drying out and this may be as a result of water abstraction by the golf course. A small caravan park (code 608) in the northerneast at Lagacurry lies outside of the cSAC, however associated recreational activities, such as walking (code 622) and trampling (720) are likely to impact the sand dunes. In the southern part of the site there is some localised erosion around the access area to the beach at Pollan Bay, however it is limited to this area and concentrated where a small playground is provided for children. Sand extraction (code 300) has been noted in the past at Doagh Isle (MPSU, undated) and this is ongoing in the machair and fixed dunes. Dumping (code 790) of household and agricultural waste was also noted in these habitats during this survey.

There is evidence of natural erosion (code 900) along the seaward edge of the sand dunes caused by winter storms. However, the cobble beach is providing a good natural barrier to erosion.

It is difficult to determine the impacts on the perennial vegetation of stony banks as the cobble beach is naturally mobile and sparsely vegetated. The cobble is uneven and difficult to walk on and most walkers use a narrow track worn in the semi-fixed dunes that edge the golf course fenceline. Other visitors use the lower beach on the seaward side of the cobble.

**Table 178B** Intensity and impact of various activities on sand dune habitats at Doagh Isle

EU Habitat Code <sup>1</sup>	Activity Code <sup>2</sup>	Intensity <sup>3</sup>	Impact <sup>4</sup>	Area affected/ha	Location of Activity <sup>5</sup>
H21A0	103	B	-1	10	Inside
H2130	103	B	-1	15	Inside
H21A0	140	A	+1	150	Inside
H2130	140	A	+1	30	Inside
H21A0	142	A	-1	60	Inside
H2130	142	A	-1	100	Inside
H2190	142	A	-1	5	Inside
H21A0	146	A	-1	60	Inside
H2130	146	A	-1	100	Inside
H21A0	149	C	-1	5	Inside
H2130	149	C	-1	4	Inside
H21A0	150	A	-1	90	Inside
H21A0	300	B	-2	0.4	Inside
H2130	300	B	-2	0.5	Inside
H21A0	601	A	-1	15	Outside/Inside
H2130	601	A	-1	10	Outside/Inside
H2130	608	C	-1	5	Outside
H21A0	622	C	-1	10	Inside
H2130	622	B	-1	100	Inside
H2120	622	A	-1	0.7	Inside
H1220	622	A	-1	1	Inside
H21A0	720	B	-1	20	Inside
H2130	720	B	-1	40	Inside
H21A0	790	B	-1	5	Inside
H2130	790	B	-1	5	Inside
H2130	900	B	0	Unknown	Inside
H2120	900	A	0	Unknown	Inside
H21A0	954	A	-1	15	Inside
H2130	954	A	-1	10	Inside
H2190	954	A	-1	3	Inside

<sup>1</sup>EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.

<sup>2</sup>Description of activity codes are found in Appendix 3

<sup>3</sup>Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.

<sup>4</sup>Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence

<sup>5</sup>Location of activity: Inside = activities recorded within and directly impacting the cSAC. Outside = activities recorded outside but adjacent to sand dune habitat that are impacting the cSAC

## CONSERVATION STATUS

The conservation status of a site is assessed on the current condition of the site and on baseline information. The main source of baseline information for this Doagh Isle was from the ASI survey, the NATURA 2000 report and the most recent Conservation Plan for the site (MPSU, undated).

**Table 178C** Conservation status of Annex I sand dune habitats at Doagh Isle

Habitat <sup>1</sup>	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system <sup>2</sup>
	Favourable	Unfavourable - Inadequate	Unfavourable - Bad		
Machair (H21A0)		Extent, Future Prospects	Structure & Functions,	Unfavourable-bad	Unfavourable-declining
Fixed Dunes (H2130)		Extent, Future Prospects	Structure & Functions	Unfavourable-bad	Unfavourable-declining
Humid Dune Slack (H2190)	Extent	Future Prospects	Structure & Functions	Unfavourable-bad	Unfavourable-declining
Mobile Dunes (H2120)	Extent, Structure & Functions	Future Prospects		Unfavourable-inadequate	Unfavourable-unchanged
Perennial vegetation of stony banks (H1220)	Structure & Functions, Future Prospects	Extent		Unfavourable-inadequate	Unfavourable-unchanged

<sup>1</sup>EU Codes as per Interpretation Manual

<sup>2</sup>Ratings are Favourable (Enhanced, Maintained, Recovered, Declining), Unfavourable (Recovering, Unchanged, Declining) and Destroyed (Partially destroyed, Completely destroyed and Unknown)

**Table 178D** Pass/Fail results of monitoring stops for Annex I sand dune habitats at Doagh Isle

Habitat	Monitoring stops		Conservation status
	Pass	Fail	
Machair (H21A0)	5	2	Unfavourable-bad
Fixed Dunes (H2130)	9	5	Unfavourable-bad
Dune Slack (H2190)	1	1	Unfavourable-bad
Mobile Dunes (H2120)	2	0	Favourable
Perennial vegetation of stony banks (H1220)	4		Favourable

### **Machair (H21A0)**

The extent of machair is rated as *unfavourable-inadequate* (Table 178C). This assessment is based on comparisons between the previous MPSU maps of extent and the current extent. There is some decline in area of the machair due to sand extraction and erosion exacerbated by rabbit burrowing and overgrazing.

The structure and functions parameter is rated as *unfavourable-bad*. Seven monitoring stops were placed in the machair area and two of these failed (Table 178D). The two monitoring stops failed to reach the targets for three of the attributes, sward height, flowering and fruiting and lastly negative indicator species. The machair fields are overgrazed mainly in the western section of the habitat, where there is a poor diversity

of flowering species and a high percentage cover of *Senecio jacobaea* (Common ragwort). Although bare sand cover reached its target in the monitoring stops, the overall habitat contains areas of bare sand dotted throughout due to erosion caused by, overgrazing, rabbit burrowing and sand extraction. These activities are undermining the structure of the habitat.

The future prospects for this site are considered *unfavourable-inadequate* on the basis that the machair is deteriorating in condition due to intensive agricultural management and the lack of control on the local rabbit population. The need for suitable grazing regimes for machair is recognised in the MPSU conservation plan for this site. However, the results of the current survey would indicate that the grazing pressures on the machair at Doagh Isle are severe, most notably in the western section of this habitat. Until action is taken, it is likely that the machair will continue to decline, threatening the future viability of this habitat at Doagh Isle. The machair is also under on-going pressure from sand extraction and golf course expansion.

The conservation status of the machair within the entire cSAC is described as *average or reduced conservation* in the NATURA 2000 survey. Currently, the overall EU conservation status of the machair is considered *unfavourable-bad* (Table 178C).

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

### **Fixed Dunes (H2130)**

The extent of fixed dunes is rated as *unfavourable-inadequate* (Table 178C). The extent has been reduced by intensive agricultural management of the fixed dune fields and by sand extraction.

The structure and functions parameter is rated as *unfavourable-bad*. A total of fourteen monitoring stops were placed in the fixed dunes and five of these failed (Table 178D). The attributes that failed most often to reach their targets were, typical species, flowering and fruiting and negative indicator species. This appears to be related to a combination of overgrazing in places, overwintering of livestock and supplementary feeding. Common ragwort (*Senecio jacobaea*) and other agricultural weeds are now flourishing in the sward due to disturbance and soil enrichment. The

sward is currently tightly grazed and is overgrazed in places. It is apparent that the fixed dunes require closer examination to develop an appropriate grazing and management plan specific to this site. Rabbit burrowing and sand extraction are also undermining the structure of the fixed dune habitat.

The future prospects for the fixed dunes are considered *unfavourable-inadequate* as the pressure from unsustainable grazing continues and the invasion of agricultural weeds is not controlled. The need for a suitable grazing regime for this habitat is recognized in the conservation plan but until one is implemented the conservation status will remain unfavourable.

The conservation status of the fixed dunes at the entire cSAC is described as *average or reduced conservation* in the NATURA 2000 survey. Currently, the overall EU conservation status of fixed dune is *unfavourable-bad* (Table 178C).

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

### **Dune Slack (H2190)**

The extent of dune slack at Doagh Isle is rated as *favourable* as there is no indication that the area has declined in recent times. This is based on best scientific judgement as this area of dune slack is not indicated on any of the previous maps available for this site and it is not mentioned in the MPSU conservation plan.

The structure and functions parameter is rated as *unfavourable-bad*. Two monitoring stops were placed in this habitat and one of these failed (Table 178D). The monitoring stop failed to reach the targets for the attributes of negative indicator species and the ratio of forbs to grasses. The slack is tightly grazed by sheep and contains a high cover of agricultural weeds. The slack appears to be drying out and some areas are dominated by grasses. The hydrology of the slack may have been altered due to its close proximity to the golf course. However, a study of the hydrology of the area would be required to confirm this.

The future prospects for this dune slack are considered *unfavourable-inadequate*. The current recreational and agricultural management appears inappropriate for the dune

slack and threatens the viability of this habitat at Doagh Isle. The MPSU plan for Doagh Isle should be adjusted to take dune slack into account in future conservation planning for the site, as although it is part of the fixed dune, it requires more specific management.

The conservation status of the dune slack is not assessed in the NATURA 2000 survey as the site is not listed for this habitat. Currently, the overall EU conservation status of dune slack is *unfavourable-bad* (Table 178C), as the slack area is under threat from agricultural activities and may be impacted by water abstraction associated with the golf course.

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

### **Mobile Dunes (H2120)**

Most of the site is fronted by a storm beach and rocky shoreline, as opposed to building dunes. Therefore, a large extent of mobile habitat is not anticipated at this site. There is a small area of mobile dunes fronting the fixed dunes in the more sheltered bay at Lagacurry and this appears intact. Therefore, the extent of mobile dunes is rated as *favourable* at Doagh Isle (Table 178C) and this is based on best scientific judgement.

The structure and functions parameter is rated as *favourable*. Two monitoring stops were placed in the mobile dunes and these passed (Table 178D).

The future prospects of this habitat are considered *unfavourable-inadequate*. This rating is attributable to the ongoing threat from invasion by agricultural weeds. This is evident in one of the monitoring stops which has reached the threshold for cover of negative indicator species.

Currently, the overall EU conservation status of mobile dunes is *unfavourable-inadequate* (Table 178C).

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

### **Embryonic Dunes (H2110)**

The extent of this habitat is very minor and therefore is not assessed.

### **Perennial vegetation of stony banks (H1220)**

The extent of this habitat is rated as *unfavourable-inadequate*. This is attributable to shingle extraction at the site noted in the MPSU plan. Given the lack of detailed information about this activity at Doagh Isle, the assessment is based on best scientific judgement.

Four monitoring stops were placed in this habitat and all of these passed. Based on an overall visual assessment of this habitat and presence/absence of typical species, the conservation status of the structure and functions is rated as *favourable*.

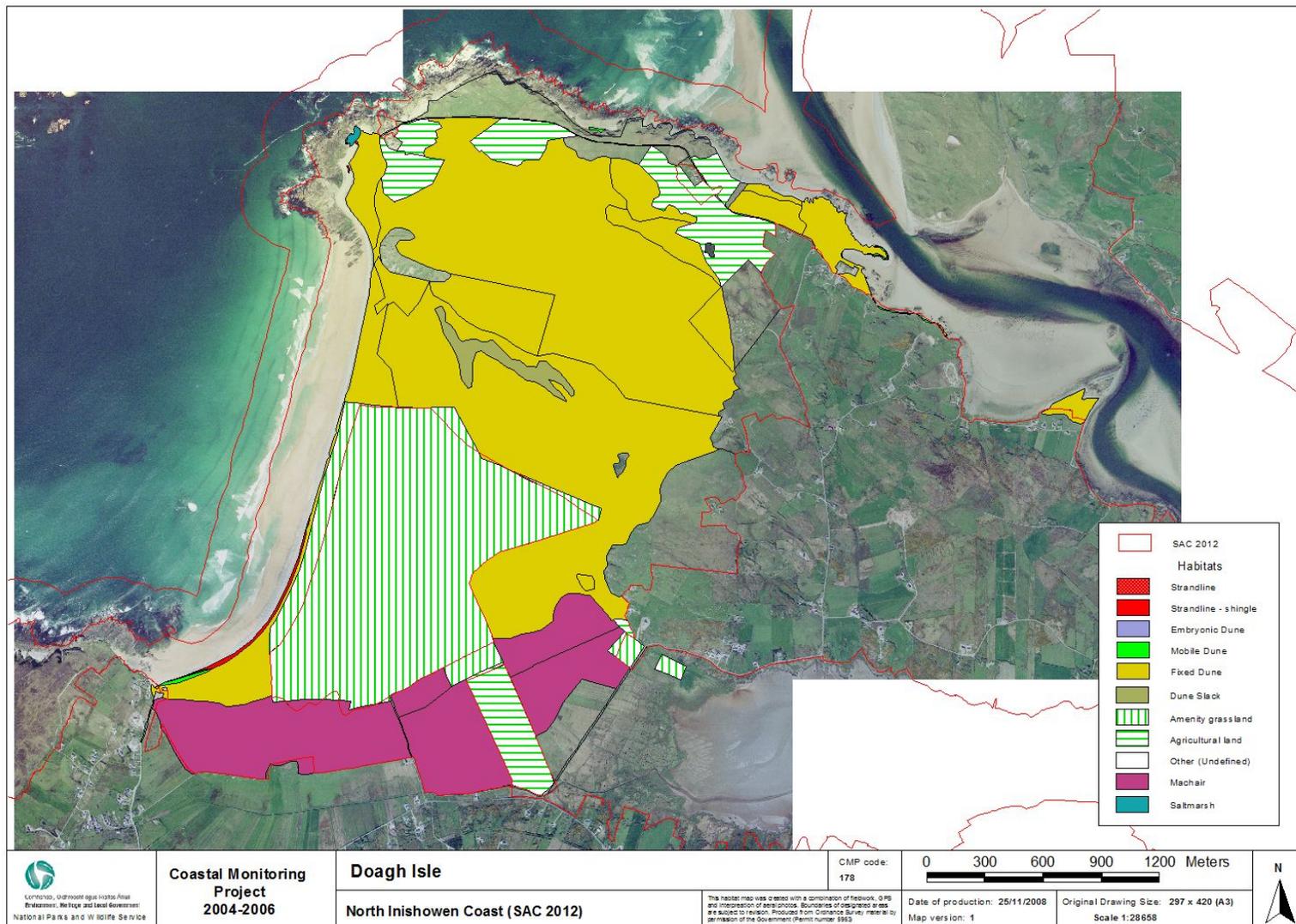
Future prospects are considered *favourable*. The issue of shingle extraction is recognized in the MPSU conservation plan and efforts to halt this activity will be undertaken, where possible. It is not apparent if this activity is on-going at Doagh Isle and the favourable rating would change if it is. Perhaps the installation of barriers to vehicles at all access points to the beach may help to prevent this damaging activity. This is a very extensive area of cobble and is an important asset to the sand dune and machair system, providing a natural barrier to winter storms and erosion.

There are currently no manmade structures impeding the movement of the shingle and this situation should be maintained as far as possible.

The overall EU conservation status is currently regarded as *unfavourable-inadequate* and the Irish conservation status is *unfavourable-unchanged* (Table 178C).

### **Annual Strandline (H1210)**

Given the small area of this habitat at Doagh Isle, a conservation assessment was not carried out.



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

### SITE DETAILS

CMP06 site name: **Lag**      CMP06 site code: **179**    CMP Map No.: **177**

County: **Donegal**      Discovery map: **3**      Grid Reference: **C 427 526**

6 inch Map No.: **Do 4**

Aerial photographs (2000 series): **O0012-A, B, C, D**

NPWS Site Name: **North Inishowen Coast**

NPWS designation:    pNHA: **2012**    cSAC: **2012**    SPA: **4034**

Ranger Area: **Donegal**

MPSU Plan: **Draft 2:Consultation**

Report Author: **Kieran Connolly**

### SITE DESCRIPTION

Lag sand dunes, near the northern tip of the Inishowen Peninsula in Donegal, are approximately 8km south of Malin Head, and 5km north of Malin village. The dunes stretch over almost 2km of west-facing coastline on the northern side of Trawbreaga Bay and extend landwards for over 500m along their entire length.

The site is included in the North Inishowen Coast cSAC - which encompasses approximately 45km of coastline around the Inishowen Peninsula, from Crummie's Bay in the west to Inishowen Head in the east - as are six other sand dune sites dealt with in the present report. The other sites, with site numbers in parentheses are Crummie's Bay (175), Lenankeel (176), Tullagh (177), Doagh Isle (178), White Strand (180) and Culdaff (181). Doagh Isle sand dunes – by far the most extensive dunes in the cSAC - are on the opposite side of Trawbreaga Bay, separated from Lag by a narrow channel.

Lag is one of the larger sand dune sites on the Inishowen peninsula and contains a considerable expanse of fixed dunes - a priority Annex I habitat (Table 179A). Several other Annex I habitats were mapped, including the uncommon 'Dunes with *Salix repens*', although a number of the habitats were quite insubstantial in extent.

The site was included on the previous NPWS sand dune site inventory (Curtis, 1991a) as one at which Machair formed part of the sand dune system. However, the dunes are not referred to as a machair site in the cSAC management (MPSU) plan, nor are there any other sources within the NPWS site file that reveal the supposed location of the habitat. The habitat was not recognised at the site during the current survey.

The extensive dunes are frequently quite tall, rising in places to at least 25m above the beach level, while some of the dunes in the northernmost part of the site have formed over the underlying low rocky hills and rise steeply away from the seaward edge of the system. The landward (eastern) extremes of the dune grassland in the central and southern parts of the site level off quite considerably, while the dunes are bordered on the eastern side by rocky hills that rise quite steeply.

**Table 179A** Areas of EU Annex I habitats mapped at Lag

EU Code	EU Habitat	Area (ha)
H1210	Annual vegetation of driftlines	0.091
H1220	Perennial vegetation of stony banks	0.091
H2110	Embryonic shifting dunes	0.135
H2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i>	2.017
H2130	Fixed coastal dunes with herbaceous vegetation	107.917
H2170	Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (Salicion arenaria)	0.182
H2190	Humid Dune Slacks	0.657
	<b>Total Sand dune</b>	<b>111.090</b>

Trawbreaga Bay is a Special Protection Area (SPA), designated due to its importance for wintering wildfowl, including three species listed in Annex I of the Birds Directive - Barnacle Goose (which occurs in internationally important numbers), Whooper Swan and Great Northern Diver. Brent Geese also occur in internationally important numbers, while Ringed Plover occur in nationally important numbers. Choughs were heard during the site visit for the present report.

Access to the site is unhindered, with car parking space available (the location of which is included as a 'miscellaneous' point on the site digital map) at the north end of the dunes. The access road that runs through a substantial part of the dunes is also included as a theme on the site map. The beach (Back Strand) is quite heavily used for recreational activities.

### **Fixed Dunes (H2130)**

Fixed dunes, with a mapped area of 107.917ha, account for almost the entire sand dune area at the site (Table 179A). Much of the fixed dunes are well grazed by both sheep and cattle and the abundant short turf supports a good diversity of typical species. A number of the monitoring stops carried out in fixed dunes had in excess of 20 species. Among the more common species noted were *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), *Luzula campestris* (Field wood-rush), *Plantago lanceolata* (Ribwort plantain), *Thymus polytrichus* (Wild thyme), *Trifolium repens* (White clover) and *Veronica chamaedrys* (Germander speedwell). Where grazing is less intensive, *Ammophila arenaria* (Marram) usually forms a significant element of the vegetation.

Bryophyte cover is generally well developed and among the commonly noted moss species were *Calliergonella cuspidata*, *Hylocomium splendens*, *Rhytidiadelphus squarrosus*, *Rhytidiadelphus triquetrus*, *Scleropodium purum*, *Tortula ruraliformis* and *Plagiomnium undulatum*.

The dunes may have been somewhat overgrazed in recent times, as indicated by the presence of species such as *Cirsium arvense* (Creeping thistle) and *Senecio jacobaea* (Common ragwort). However, damage to the dunes is mostly in small, localised areas where activities such as re-seeding of swards and supplementary feeding of livestock have been carried out.

In other areas, particularly in the western end of the site where the dunes rise steeply over rock formations, a significant area is relatively inaccessible to cattle. Here, the lower grazing intensities have led to the encroachment of scrub species – mostly *Prunus spinosa* (Blackthorn) and *Rubus fruticosus* (Bramble) - and also *Pteridium aquilinum* (Bracken) which forms a number of dense clumps in the higher ground.

Comparison with the site aerial photographs (year 2000 series) that are included on the site digital map, reveals the significant degree to which the dunes have eroded in recent times, particularly at the north end, where foredunes are absent and fixed dunes currently form much of the seaward boundary of the dunes. In places, fixed dune

vegetation has slumped onto the front face of the dunes, which is quite steeply eroded along a significant portion of its length.

The landward boundary of the fixed dunes in the northeast corner was difficult to determine precisely, as the habitat is bordered by improved agricultural land and sand cover becomes intermittent or indistinct over a significant area. A substantial tract of land within the cSAC boundary is mapped here as agricultural, while another area (encompassing land to the east of the graveyard) is outside the cSAC boundary, but has been included within the fixed dune area.

### **Dune Slacks (H2190)**

A single dune slack, with an area of 0.657ha, was mapped in the eastern (landward) side of the dunes. Like the surrounding fixed dune area, the slack was grazed by sheep and cattle.

Among the typical dune slack species noted – which identified the slack as being of a ‘wet’ type - were the moss *Calliergonella cuspidata*, *Carex nigra* (Common sedge), *Hydrocotyle vulgaris* (Marsh pennywort) and *Prunella vulgaris* (Selfheal). A small stand of *Pteridium aquilinum* (Bracken) was noted in the south end of the habitat.

### **Dunes with *Salix repens* (H2170)**

The small area (0.181ha) of dunes with *Salix repens* adjoins the only dune slack at the site, near to the eastern (landward) edge of the dunes. The habitat, on an east-facing slope, was characterised by the presence of *Salix repens* (Creeping willow), at a greater cover/abundance level than which it existed in the dune slack. The drier conditions on the slightly raised and sloping ground have probably promoted the more extensive growth of *S. repens*. Most of the other species noted were among the more common dune slack species.

### **Mobile Dunes (H2120)**

The total area of mobile dunes mapped at the site was 2.017ha, most of which was confined to the southern half of the long west-facing coastline. A tiny stretch mapped around a stream entry point to the strand in the southeast corner of the site can be attributed to the local reworking of sediment by the action of the stream.

The habitat was characterised by the constant presence of *Ammophila arenaria* (Marram), while lesser amounts of *Elytrigia juncea* (Sand couch) were found throughout.

### Annual Strandline (H1210)

Occasional *Cakile maritima* (Sea rocket) and *Honckenya peploides* (Sea sandwort) were noted along the strand, but almost nowhere were they sufficiently substantial to justify mapping as habitat. One small area of habitat was mapped near the south end of the site, in the area where most of the foredune habitat at the site currently exists.

## IMPACTS

Activities observed or known to be impacting on the sand dune habitats at Lag are shown in Table 179B.

**Table 179B** Intensity and impact of various activities on sand dune habitats at Lag

EU Habitat Code <sup>1</sup>	Activity Code <sup>2</sup>	Intensity <sup>3</sup>	Impact <sup>4</sup>	Area affected/ha	Location of Activity <sup>5</sup>
H2130	103	A	-1	10	Inside
H2130	140	A	+2	75	Inside
H2130	149	B	-1	5	Inside
H2130	171	A	-1	1	Inside
H2130	420	C	-1	0.5	Inside
H2130	490	A	-1	1	Inside
H2130	502	A	-2	1	Inside
H2120	622	B	-1	2	Inside
H2130	622	C	-1	10	Inside
H2120	871	B	0	unknown	Inside
H2130	871	C	+2	unknown	Inside
H2120	900	A	0	unknown	Inside
H2130	900	A	0	5	Inside
H2130	954	B	-1	3	Inside
H2190	954	C	-1	0.1	Inside

<sup>1</sup>EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.

<sup>2</sup> Description of activity codes are found in Appendix 3

<sup>3</sup> Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.

<sup>4</sup> Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence

<sup>5</sup> 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

The fixed dunes at Lag are grazed (code 140) by both sheep and cattle. In general, the intensity of grazing is such that it may be considered as a positive influence throughout much of the dunes (Table 179B), with no significant overgrazed areas and

only a very small proportion that need be considered as undergrazed (code 149). The small area of undergrazed fixed dunes (mostly in the north end of the dunes) is due, at least in part, to the steepness of the rocky inclines over which the dunes have formed here. Such areas are not readily accessible to cattle and are grazed only by sheep and rabbits. Correlated with the lower grazing intensities in parts of the fixed dunes is the encroachment of scrub species (code 954) – mostly *Prunus spinosa* (Blackthorn) and *Rubus fruticosus* (Bramble) - and also *Pteridium aquilinum* (Bracken).

Although the legend 'Rabbit Warren' is included on the site 6" map (which is supplied as a theme on the site digital map), rabbits are seemingly not overly abundant in the dunes at the present time: there was no suggestion of significant erosion being initiated or exacerbated by grazing or burrowing activities. Rabbit grazing can probably be included under code 140, which refers here to the positive affects of sustainable grazing that maintains a substantial amount of short sward throughout the dune grassland and thereby promotes species diversity.

A number of livestock supplementary feeding stations (code 171) were noted in the fixed dunes during the site visit. Most of these were in the form of ring feeders. Associated with the feeding stations were the spread of nitrophilous weeds such as *Cirsium arvense* (Creeping thistle) and *Urtica dioica* (Common nettle), soil poaching, and the unsightly littering of plastic bale wrap remnants in the vicinity of the feeders. The latter impact is included - along with the dumping of tyres and other materials - under code 420 (*discharges*).

Agricultural improvement (code 103) was adjudged to have affected 10ha of fixed dunes (Table 179B). Among the practices included under this activity code were the reseeded of swards with productive agricultural grasses such as *Lolium perenne* (Perennial rye-grass) and the application of fertiliser that was suggested by the lushness of grass growth seen in the more intensively used areas.

A cemetery within the fixed dune area, clearly visible on the site aerial photographs and also identified with a 'miscellaneous' point on the site digital map, is included here (in the absence of a more appropriate activity/impact code) under 'other urbanisation' (code 490).

Much of the recreational use (code 622) of the site is concentrated in the beach area, due largely to the agricultural management of most of the dune system. Well maintained fencing also serves to discourage visitor access into much of the dune area. The site does experience substantial visitor numbers however, due to its scenic and attractive nature, its location in a popular visitor area and the proximity of Malin Head, which, being the most northerly point in Ireland, is a popular attraction for visitors.

Motor vehicles are mostly excluded from the dune area, although metalled roads through the site (code 502) have accounted for a certain amount of natural dune habitat.

Coastal protection works (code 871) – largely consisting of the placement of straw bales at the foot of the front dune face - were present over a substantial part of the seaward edge of the dunes. Erosion has apparently been severe in recent times, such that there is currently very little foredune habitat at the seaward edge of the dunes. The protection/stabilisation works have probably had some affect in stabilising a small amount of mobile dune habitat in the south end of the site and have therefore not been considered as a negative influence (Table 179B). Similarly, the protection afforded the adjacent fixed dunes has been considered as a positive influence on the habitat. However, it may be more appropriate, in the long term, to consider all such dune protection works as having a negative influence, due to the disruption caused to the natural functioning of the system.

Natural erosion (code 900) has been severe in recent times: a comparison of the present habitat boundaries with those in the site aerial photographs (2000 series) shows a substantial retreat of dunes, particularly in the northern half. In places the front edge of the dunes has been eroded to leave a very tall and steep front face. Foredune habitat is now very limited although there has been some build-up in the southern half of the site where sand-trapping/dune protection measures – in this case straw bales – have been put in place.

## CONSERVATION STATUS

The overall conservation status assessment of each habitat at Lag is based on a combination of *Habitat Extent, Structure & Functions*, and *Future Prospects* assessments (Table 179C). Structure and functions are assessed by means of monitoring stops carried out in the habitats (Table 179D).

There are no previous data with which the current results may be compared for the purposes of assessing habitat conservation status. Habitat extent data in the relevant NATURA 2000 data form refers to the cSAC as a whole, which in this case encompasses seven of the sites included in the present report, and is therefore of little use in evaluating changes from previous conditions. For this reason, the conservation status assessment of habitats is largely based on the current condition of habitats, and relies on the judgement of the report author.

Conservation status assessments are not provided for Annual vegetation of driftlines (1210), Perennial vegetation of stony banks (1220) or Embryonic shifting dunes (2110), as each of these habitats covered only a negligible total area.

### **Fixed Dunes (H2130)**

Although erosion has been quite severe at the site in recent times, resulting in a significant retreat of the dunes (particularly in the northern half), there are no definite indications that the loss of area is attributable to recreational or other human-induced pressures at the site. For this reason, extent (area) is regarded as *favourable*.

All twelve fixed dune monitoring stops met the overall target criteria, indicating *favourable* structure and functions. Three of the stops failed the negative indicator species target, which in two cases was due to an excessive cover of *Pteridium aquilinum* (Bracken), while 10% cover of *Senecio jacobaea* (Common ragwort) explained the failed target in the third stop. In all of these cases, all other attribute targets were met and the monitoring stops passed the overall criteria.

Future prospects for the fixed dunes are considered to be *unfavourable-inadequate*. Although structure and functions were *favourable*, several factors including the spread of *Pteridium aquilinum* (Bracken) and scrub species such as *Prunus spinosa*

(Blackthorn) and *Rubus fruticosus* (Bramble), the relative frequency of nitrophilous weed species and other localised damage resulting from the presence of livestock feeding stations and the reseeded of swards (albeit on a small scale) with 'agricultural' grasses, indicate that a negative assessment of future prospects is appropriate. An *unfavourable-inadequate* rather than *unfavourable-bad* assessment reflects the fact that the threats currently facing the habitat are probably less than severe.

**Table 179C** Conservation status of Annex I sand dune habitats at Lag

Habitat <sup>1</sup>	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system <sup>2</sup>
	Favourable	Unfavourable - Inadequate	Unfavourable - Bad		
<b>Fixed Dunes (H2130)</b>	Extent/ Structure & functions	Future prospects		<b>Unfavourable - Inadequate</b>	<b>Unfavourable - unchanged</b>
<b>Mobile Dunes (H2120)</b>		Extent/ Structure & functions/ Future prospects		<b>Unfavourable - Inadequate</b>	<b>Unfavourable - unchanged</b>
<b>Dunes with Salix repens (H2170)</b>	Extent/ Structure & functions	Future prospects		<b>Unfavourable - Inadequate</b>	<b>Unfavourable - unchanged</b>
<b>Dune Slack (H2190)</b>	Extent/ Structure & functions	Future prospects		<b>Unfavourable - Inadequate</b>	<b>Unfavourable - unchanged</b>

<sup>1</sup>EU Codes as per Interpretation Manual

<sup>2</sup>Ratings are Favourable (Enhanced, Maintained, Recovered, Declining), Unfavourable (Recovering, Unchanged, Declining) and Destroyed (Partially destroyed, Completely destroyed and Unknown)

As the individual components of conservation status assessment are a combination of *favourable* and *unfavourable-inadequate* assessments, the overall assessment is *unfavourable-inadequate*.

The assessment thought most appropriate under the proposed Irish conservation status system is *unfavourable-unchanged*, reflecting the probable long-term existence of several negative impacts in the habitat.

### **Mobile Dunes (H2120)**

The severe erosion events which have occurred in recent times - as evidenced by a comparison with the current seaward habitat boundaries and those on the site aerial

photographs taken in 2000 and the presence of a very steeply eroded and tall face along the seaward edge of the fixed dunes - has almost certainly removed a substantial amount of mobile dune habitat. However, the scale of the recent erosion, suggests it is most likely attributable to natural causes, such as wind and wave action, rather than human-induced affects. Sand-trapping measures appear to have led to accretion of foredune habitat in the southern half of the dunes, although this is not considered in purely positive terms, as one affect of trapping sand in a certain location may be to starve another area of sediment. Although there is a lack of direct evidence of loss of habitat through human pressures, the assessment thought most appropriate - based on the current condition of the habitat, in which the total area is small and zonation is poor - is *unfavourable - inadequate*.

Of the four monitoring stops carried out in the assessment of structure and functions, three passed and one failed the overall attribute targets, indicating *unfavourable-inadequate* structure and functions. All of the stops had an ample cover of *Ammophila arenaria* (Marram), which in each case was generally composed of healthy material. Two of the stops had a negative indicator species component – which in each case was entirely accounted for by *Cirsium arvense* (Creeping thistle) – and in one case the total cover exceeded the maximum threshold of 5%, leading to the overall failure of the stop.

Future prospects for the habitat are considered *unfavourable-inadequate* due to the unlikelihood of any short-term accretion of habitat. The lack of foredune development in the dunes suggests the system is suffering from sediment depletion.

**Table 179D** Pass/Fail results of monitoring stops for Annex I sand dune habitats at Lag

Habitat	Monitoring stops		Conservation status
	Pass	Fail	
Fixed Dunes (H2130)	12	0	Favourable
Mobile Dunes (H2120)	3	1	Unfavourable - Inadequate
Dunes with <i>Salix repens</i> (H2170)	1	0	Favourable
Dune Slack (H2190)	1	0	Favourable

As the three individual parameters of conservation status are all rated as *unfavourable-inadequate*, that is the overall assessment that applies to the habitat.

The most appropriate assessment under the corresponding Irish system is considered to be *unfavourable-unchanged*. Although the habitat may have been significantly affected by recent erosion events, these are considered to be mostly natural in origin. The assessment, therefore, reflects the probable long term existence of the other factors that have led to the compromised condition of the habitat, such as those that have resulted in a significant negative indicator species component within the habitat.

### **Dune Slacks (H2190)**

There were no data within the site files to indicate the former presence or extent of the only dune slack mapped here. In the absence of any evidence of a recent loss of area, the habitat is assessed as *favourable* for extent.

A single monitoring stop, in which all the attribute targets were achieved, was carried out in the only mapped area of dune slack, on the eastern side of the site. As there were no failed monitoring stops, structure and functions are rated as *favourable*.

Future prospects are regarded as *unfavourable-inadequate* as the dune slack is within an area of the dunes where there has been some degree of agricultural improvement. Although the only monitoring stop carried out achieved an overall pass, the cover of broad-leaved grasses was sufficient to suggest that some eutrophication is occurring in the slack. A small stand of *Pteridium aquilinum* (Bracken) was also noted in the slack.

As the individual components of conservation status assessment are a combination of *favourable* and *unfavourable-inadequate* assessments, the overall assessment is *unfavourable-inadequate*.

As the current condition of the habitat is likely to have existed for some time, the most appropriate assessment under the corresponding Irish system is considered to be *unfavourable-unchanged*.

### **Dunes with *Salix repens* (H2170)**

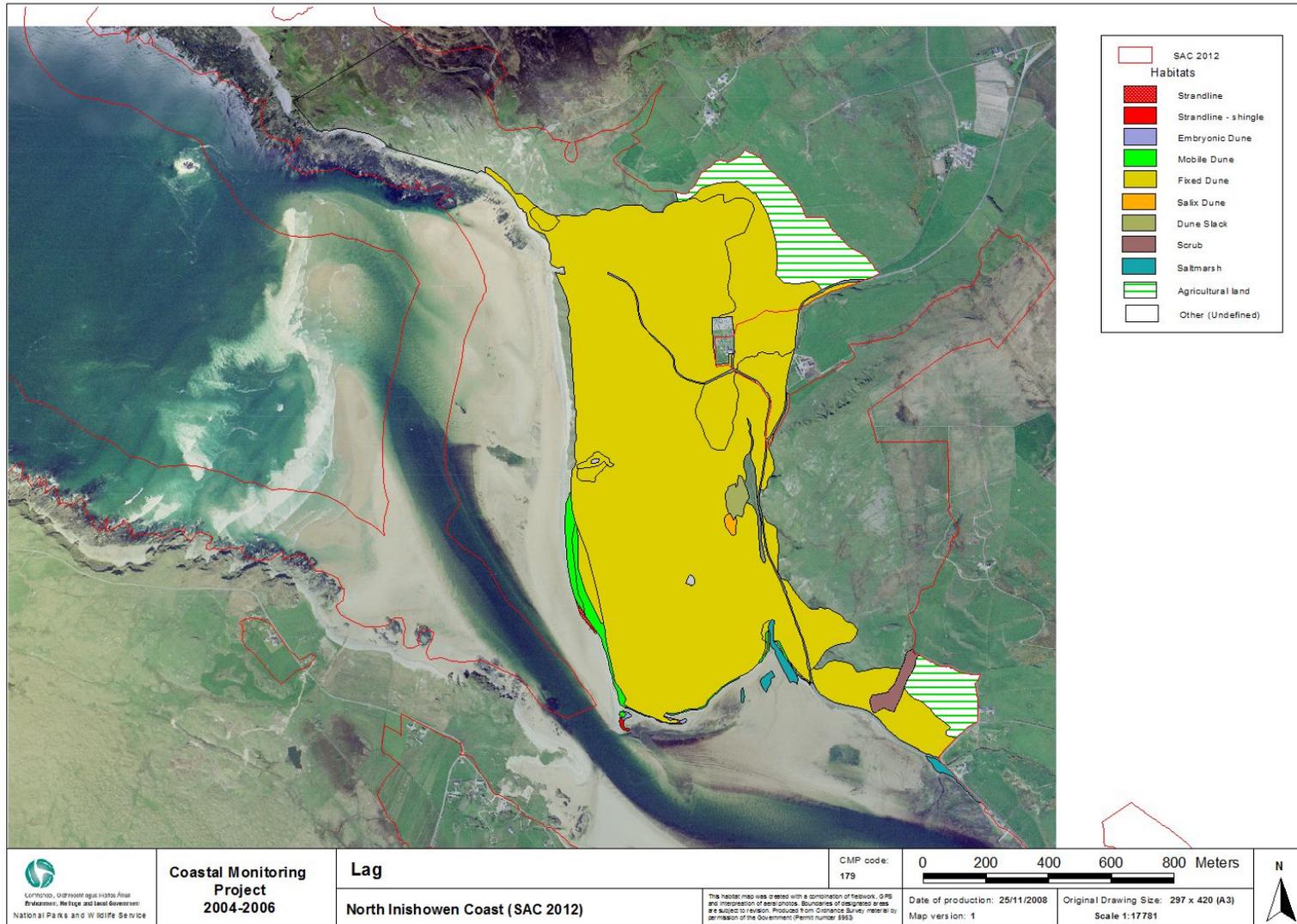
As is the case with the only dune slack mapped at the site, there are apparently no previous data or maps indicating the presence or extent of dunes with *Salix repens*. In the absence of any evidence of a recent loss of area, habitat extent is considered to be *favourable*.

As the only monitoring stop carried out met the overall criteria, structure and functions are considered to be *favourable*.

As the small area of dunes with *Salix repens* adjoins the only dune slack at the site, the habitat is thought to be susceptible to the same negatively impacting pressures (mostly relating to intensive agricultural management practices) that threaten the future integrity of the dune slack. Future prospects are therefore also considered to be *unfavourable-inadequate*.

As the individual components of conservation status assessment are a combination of *favourable* and *unfavourable-inadequate* assessments, the overall assessment is *unfavourable-inadequate*.

Because of the lack of previous information on the habitat at the site, and the likelihood that the same pressures have been present for some time, *unfavourable-unchanged* is considered to be the most appropriate assessment under the Irish system of habitat assessment.



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

### SITE DETAILS

CMP06 site name: **White Strand**    CMP06 site code: **180**    CMP Map No.: **178**

County:**Donegal**            Discovery map: **3**            Grid Reference: **C414 565**

6 inch Map No.: **Dg 01 & 02& 04**

Aerial photographs (2000 series): **O 0003-D; O 0004-D, C; O 0007-A, B, C, D.**

NPWS Site Name: **North Inishowen Coast**

NPWS designation:    **pNHA: 2012    cSAC: 2012**

Ranger Area: **West**

MPSU Plan: **Draft 2 Consultation 2000**

Report Author: **Melinda Swann**

### SITE DESCRIPTION

White Strand is part of the North Inishowen Coast cSAC 2012, which stretches for approximately 45 km around the coastline of the Inishowen Peninsula in north County Donegal. The cSAC as a whole has a rich diversity of habitats and in particular is noteworthy for the extensive shingle beaches. The cSAC has been designated for the presence of the Annex I habitats ‘Fixed coastal dunes with herbaceous vegetation’ (priority habitat), ‘Machair (priority in Ireland only), ‘Vegetated sea cliffs of the Atlantic and Baltic Coasts’, Perennial vegetation of stony banks’, ‘Dry heaths’, Annual vegetation of driftlines’, Estuaries’ and ‘Mudflats and sandflats not covered by seawater at low tide’.

A number of rare plant species have been recorded on the sea cliffs within the cSAC including *Ligusticum scoticum* (Scot’s lovage) and *Orobanche hederæ* a locally rare species of broomrape parasitic on *Hedera helix* (Ivy). Other noteworthy species are *Silene acaulis* (Moss campion) and *Saxifraga oppositifolia* (Purple saxifrage), which are listed in the Red Data Book as they are protected in Northern Ireland. The rare and legally protected Oyster plant (*Mertensia maritima*) has also been recorded within the cSAC on shingle habitat at White Strand.

The sea cliffs provide important nesting and feeding areas for a number of Annex I species of bird, such as *Pyrhocorax pyrrhocorax* (Chough) and *Falco peregrinus* (Peregrine falcon), with other seabird species such as *Fulmarus glacialis* (Fulmar), *Phalacrocorax carbo* (Cormorant), *Phalacrocorax aristotelis* (Shag), *Larus tridactyla* (Kittiwake), *Uria aalge* (Guillemot), *Alca torda* (Razorbill) and *Cepphus grylle* (Black Guillemot) also utilising the habitat. To the south of White Strand the bay at Trawbreaga provides important feeding grounds for species such as *Anas penelope* (Wigeon), *Anas platyrhynchos* (Mallard), *Haematopus ostralegus* (Oystercatcher), *Charadrius hiaticula* (Ringed Plover), *Calidris alpina* (Dunlin), *Numenius arquata* (Curlew) and *Tringa totanus* (Redshank). The mudflats also support Internationally important goose populations such as *Branta leucopsis* (Barnacle Goose) (Annex I) and *Branta bernicla* (Brent Goose).

The Annex II mammal species, *Lutra lutra* (Otter) is also regularly seen along the coastline within the cSAC.

White Strand itself has an extensive shingle beach with cliffs to the north and south of the bay. There is a small area of fixed dunes and machair but both habitats have been somewhat altered by agricultural practices and development. Extensive shingle extraction has occurred in the past near to the Oyster plant site (MPSU management plan, undated). There are also a number of caravans, which have been placed at the foot of the cliffs in the south of the site on the shingle habitat and both activities have had an affect on the structure of the shingle habitat.

The current survey concentrates on Annex I sand dune habitats found at White Strand and include machair, fixed dunes, embryonic dunes, perennial vegetation of stony banks and strandline. The areas of Annex I sand dune habitats recorded at White Strand are shown in Table 180A.

**Table 180A** Areas of EU Annex I habitats mapped at White Strand

EU Code	EU Habitat	Area (ha)
H21AO	Machair	5.9
H2130	Fixed Dunes	2.34
H2110	Embryonic Dunes	0.019
H1220	Perennial Vegetation of stony banks	2.14
H1210	Annual Strandline	0.011
	<b>Total Sand dune</b>	<b>10.4</b>
	<b>Sandy substrate area including developments/modifications*</b>	<b>13.7</b>

\* Developments and modifications include highly disturbed areas and agricultural grassland

### **Machair (H21AO)**

The machair habitat comprises 5.9ha (approximately 56.3%) of the total sand dune habitat at White Strand (Table 180A). There is a river located behind the shingle beach and behind this, are the machair to the north and the fixed dune to the south. The machair and fixed dune grassland are divided by a road, which runs along the seaward edge of the fixed dunes and then turns to the east. The machair is mostly undergrazed and dominated by *Festuca rubra* (Red fescue), with bryophytes absent. There is one small species-rich area, located near the road, which has a characteristic short sward. Here cattle graze the machair and an abundance of flowering was noted. The machair grades into a more marsh type vegetation to the east and beyond this are rushy fields, which are dominated by *Senecio jacobaea* (Common ragwort). The machair may be restorable if some large grazers were introduced however as the habitat is so small and is fenced with some houses to the east, it may be of little worth trying to restore such a small area. The machair is also currently outside the boundary of the cSAC. The MPSU Management Plan states, in its objectives, *to maintain the extent and, if possible, improve the quality of the priority habitats – Fixed dunes with herbaceous vegetation and Machair and to make boundary changes, in order to improve the ecological status of the habitats within the cSAC*. This may or may not be implemented at Whitestrand.

The typical species found in the machair at White Strand include *Lotus corniculatus* (Common bird's-foot trefoil), *Galium verum* (Lady's bedstraw), *Plantago lanceolata* (Ribwort plantain), *Linum catharticum* (Fairy flax), *Euphrasia officinalis* agg. (Eyebright), *Carex arenaria* (Sand sedge), *Carex flacca* (Glaucous sedge), *Thymus polytrichus* (Wild thyme), *Trifolium repens* (White clover) and *Prunella vulgaris* (Selfheal).

Other species found in the machair habitat include *Anthyllis vulneraria* (Kidney vetch), *Trifolium pratense* (Red clover), *Hypochaeris radicata* (Cat's ear), *Festuca rubra* (Red fescue), *Briza media* (Quaking-grass), *Angelica sylvestris* (Wild angelica), *Daucus carota* (Wild carrot), *Campanula rotundifolia* (Harebell), *Equisetum* spp. (Horsetail spp.) and *Tussilago farfara* (Colt's-foot).

Negative indicator species found in the machair habitat include: *Senecio jacobaea* (Common ragwort) and *Cirsium* spp. (Thistle spp.).

### **Fixed Dunes (H2130)**

The fixed dune habitat comprises 2.34ha (approximately 23%) of the total sand dune habitat at White Strand (Table 180A). The fixed dunes are not very extensive and have been affected by a number of anthropogenic activities such as stock feeding and agricultural improvement. There is very little intact habitat left and the fixed dunes are somewhat fragmented by both the river, which cuts the habitat off from the surrounding land and by a road, which runs along the seaward edge, cutting the habitat off from any fixed dune grassland beside the shingle ridge. There are some small patches of fixed dune grassland located near the shingle habitat in the south of the site, but these are very disturbed in appearance and, are so isolated that they do not constitute an intact functioning fixed dune system. However, there was one small area of the *Ammophila arenaria* (Marram grass) dominated fixed dune, which was monitored and was found to contain a good number of typical species. However, this area of the habitat is fenced and there were no grazers present, which meant the sward was somewhat undergrazed. Further to the south where grazing occurs, there are also a number of ring feeders, which has led to poaching by animals and an abundance of agricultural weeds and grasses near the feeders. As a result the habitat in this area has been disturbed and is not very species-rich. Overall the fixed dune habitat is so small and fragmented that any restoration possibilities would be negligible.

The typical species found in the fixed dunes include: *Cerastium fontanum* (Common mouse-ear), *Festuca rubra* (Red fescue), *Plantago lanceolata* (Ribwort plantain), *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Common bird's-foot trefoil) and *Trifolium repens* (White clover).

Other species found in the fixed dunes include *Holcus lanatus* (Yorkshire-fog), *Ammophila arenaria* (Marram grass), *Silene uniflora* (Sea campion), *Vicia* spp. (Vetch spp.), *Daucus carota* (Wild carrot), *Iris versicolor* (Purple iris) and *Cochlearia officinalis* (Common scurvygrass).

The negative indicator species found in the fixed dunes consisted of *Senecio jacobaea* (Common ragwort), which was widespread and flowering. Some *Rubus fruticosus* (Bramble) and *Ulex europaeus* (Gorse), was also noted in the habitat.

### **Embryonic Dunes (H2110)**

The embryonic dunes habitat comprises 0.019ha (approximately 0.18%) of the total sand dune habitat at White Strand (Table 180A). There is very little embryonic dunes present. The habitat consists of a few small patches of *Elytrigia juncea* (Sand couch) which are found mainly below the cliffs, north of White Strand Bay. The habitat has little chance to build up as the coast is very exposed and is mainly composed of shingle substrate. As the habitat is so minimal, no monitoring stops were carried out, therefore the conservation assessment given below is based on best scientific judgement of a visual assessment of the habitat and field notes taken on the day of survey.

### **Perennial Vegetation of Stony Banks (H1220)**

Perennial vegetation of stony banks accounts for 2.14ha (approximately 20.5%) of the total sand dune habitat at White Strand. This is the most significant habitat at White Strand as it forms a wide ridge in front of the machair and fixed dune habitats. It is one of the best examples of the habitat within Ireland, but has been subject to extensive shingle extraction in the past. As the shingle habitat is very dynamic and is constantly changing due to tidal processes and storm events, shingle extraction can lead to increased rates of erosion. A road has also been built along the edge of the habitat, which has led to a loss of area of the habitat. However, the current survey revealed that overall the habitat seems to be intact, as there is quite a large area and the typical species of the habitat are present.

In the south of the cSAC there is also a smaller road, which has been built on the unvegetated shingle and has been raised up using the surrounding pebbles. This road

has been constructed in order to gain access to the area, as there are a number of caravans, which have been placed at the foot of the southern cliffs. The MPSU plan states, as one of its objectives, *to establish the status of, and to protect rare plant species within the cSAC such as the Oyster plant.*

The typical species found in the perennial vegetation habitat include: *Tripleurospermum maritimum* (Sea mayweed), *Honckenya peploides* (Sea sandwort), *Silene uniflora* (Sea campion) and *Rumex crispus* (Curled dock).

Other species found include: *Potentilla anserina* (Silverweed), *Atriplex laciniata* (Frosted orache), *Atriplex prostrata* (Spear-leaved orache), *Plantago maritima* (Sea plantain), *Elytrigia juncea* (Sand couch), *Galium aparine* (Cleavers), *Cakile maritima* (Sea rocket), *Festuca rubra* (Red fescue), *Trifolium repens* (White clover), *Taraxacum* agg. (Dandelion), *Sonchus* spp. (Sow-thistle spp.) and *Rubus fruticosus* (Bramble).

The negative indicator species found included *Senecio jacobaea* (Common ragwort) and there was also some *Crocsmia x crocosmiiflora* (Montbretia), which is a non-native species, noted in the habitat.

### **Strandline (H1210)**

Strandline habitat comprises 0.011ha (approximately 0.11%) of the total sand dune habitat at White Strand (Table 180A). This habitat is also minimal at White Strand and is only found at the foot of the cliffs north of White Strand Bay, and is composed of *Honckenya peploides* (Sea sandwort) located on shingle. No monitoring of the habitat was carried out as it was deemed too small, therefore the conservation assessment given below is based on best scientific judgement of a visual assessment of the habitat and field notes taken on the day of survey.

### **IMPACTS**

The main threats to the site are listed in Table 180B. The machair habitat is fenced off (Code 150) and grazed by cattle (Code 140) in one field. The other field, which contains machair, is very undergrazed (Code 149) and the habitat is rank with lots of

invasive agricultural weeds (Code 960) such as *Senecio jacobaea* (Common ragwort). There was evidence of some rabbits grazing but this was minimal.

The fixed dunes are fenced into individual fields (Code 150) and there is a river running through the back of the habitat, which cuts it off from the surrounding land. Cattle graze (Code 140) the fixed dunes, but some areas were not grazed at all (Code 149). The provision of supplementary feed (Code 171) is being carried out, as there were a number of ring feeders. There is a sports pitch (Code 607) built on the landward side of the river, which is outside the cSAC. It seemed to be improved and this may act as an invasive seed base (Code 954) for the nearby fixed dunes. Some areas of the fixed dunes are agriculturally improved (Code 103).

The embryonic dunes and strandline are prone to natural erosion (Code 900), but otherwise are undisturbed.

There is a small road (Code 502) that divides much of the shingle habitat from the fixed dunes. The shingle falls onto the road from time to time and therefore in order to maintain the road it must be removed. It is not clear whether it is simply placed to the seaward side or removed altogether. In order to build the road however, shingle extraction (Code 302) has occurred in the past. The shingle habitat (vegetated and unvegetated) is also affected by natural erosion (Code 900). The vegetated shingle may be affected by some trampling (Code 720).

Although recreation is relatively low at the site there are a number of caravans (Code 608) south of White Strand Bay, which have been placed at the foot of the cliffs on the unvegetated shingle habitat. They account for about 2 hectares of this habitat. There was some localised burning (Code 180) and dumping (Code 421) noted near to the caravans and a small raised road (Code 501) has been built for improved access (Code 530) for the caravans. (Note these impacts have been placed in the table under code 21BB, although they do not affect all habitats, mainly just the unvegetated shingle).

**Table 180B** Intensity and impact of various activities on sand dune habitats at White Strand

EU Habitat Code <sup>1</sup>	Activity Code <sup>2</sup>	Intensity <sup>3</sup>	Impact <sup>4</sup>	Area affected/ha	Location of Activity <sup>5</sup>
*H21A0	140	C	+2	1.92	Inside
*H21A0	149	A	-1	3.71	Inside
*H21A0	150	A	-1	Unknown	Inside
*H21A0	960	A	-1	2	Inside
H2130	103	C	-1	2	Inside
H2130	140	B	-1	0.83	Inside
H2130	149	A	-1	0.1	Inside
H2130	150	C	-1	Unknown	Inside
H2130	171	B	-1	Unknown	Inside
H2130	607	B	-1	0.7	Outside
H2130	954	B	-1	Unknown	Inside
H2110	900	B	0	0.019	Inside
H1220	302	B	-2	Unknown	Inside
H1220	502	A	-1	Unknown	Inside
H1220	720	C	-1	Unknown	Inside
H1220	900	B	0	2.14	Inside
H1210	900	B	0	0.011	Inside
21BB	180	B	-1	Unknown	Inside**
21BB	421	B	-1	Unknown	Inside**
21BB	501	A	-1	Unknown	Inside**
21BB	530	A	-1	Unknown	Inside**
21BB	608	A	-1	2	Inside**

<sup>1</sup>EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.

<sup>2</sup>Description of activity codes are found in Appendix 3

<sup>3</sup>Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.

<sup>4</sup>Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence

<sup>5</sup>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 are impacting the sand dune habitat

\*Note the machair is outside the cSAC so in this case Inside and Outside = Inside and Outside the habitat.

\*\*Affects Unvegetated Shingle

## CONSERVATION STATUS

The conservation status of a site is assessed on condition with regards to extent, structure and functions and future prospects. The main source of baseline information for this cSAC was from the Natura 2000 report (1999) and the MPSU management plan (North Inishowen Coast cSAC – undated), although White Strand is little mentioned. Therefore the assessment of the habitats is based on best scientific judgement and the site condition during the current survey.

**Table 180C** Conservation status of Annex I sand dune habitats at White Strand

Habitat <sup>1</sup>	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system <sup>2</sup>
	Favourable	Unfavourable - Inadequate	Unfavourable - Bad		
<b>Machair (H21A0)</b>	Extent	Future Prospects	Structure & functions	<b>Unfavourable - bad</b>	Unfavourable - Declining
<b>Fixed Dunes (H2130)</b>		Extent Structure & functions Future Prospects		<b>Unfavourable - Inadequate</b>	Unfavourable - Declining
<b>Embryonic dunes (H2110)</b>		Extent Structure & functions Future Prospects		<b>Unfavourable - Inadequate</b>	Unfavourable- Declining
<b>Perennial vegetation of stony banks (H1220)</b>		Extent Structure & functions Future Prospects		<b>Unfavourable - Inadequate</b>	Unfavourable- Unchanged
<b>Annual strandline (H1210)</b>	Structure & functions	Extent Future Prospects		<b>Unfavourable - Inadequate</b>	Unfavourable- Unchanged

<sup>1</sup>EU Codes as per Interpretation Manual

<sup>2</sup>Ratings are Favourable (Enhanced, Maintained, Recovered, Declining), Unfavourable (Recovering, Unchanged, Declining) and Destroyed (Partially destroyed, Completely destroyed and Unknown)

Details of the numbers and pass/failure rates of monitoring stops used to assess habitat structure & functions at White Strand are shown in Table 180D.

### **Machair (H21A0)**

The habitat is relatively small in area at this site but as it has not been previously described and therefore there is no baseline information, the extent of the machair is considered *favourable*. The NATURA 2000 report does not specifically mention White Strand but gives a ranking of *good representativity* for the habitat for the whole cSAC (2012).

The structure and functions parameter is rated as *unfavourable-bad*. Three monitoring stops were placed in the habitat, two of which failed and one passed (Table 180D). The two monitoring stops that failed were a result of sward height greater than the target height and low species diversity. One of the stops also had a high cover of agricultural weeds >5%. This indicates changes in grazing management as well as

some agricultural improvement at the site. The NATURA 2000 report ranks the machair within the cSAC as a whole as *average or partially degraded structure*.

**Table 180D** Monitoring stop totals and pass/failure rates of Annex I sand dune habitats at White Strand

Habitat	Monitoring stops		Conservation status
	Pass	Fail	
<b>Machair (H21A0)</b>	1	2	<b>Unfavourable- bad</b>
<b>Fixed dunes (H2130)</b>	1	0	<b>Unfavourable-inadequate*</b>
<b>Perennial vegetation of stony banks (H1220)</b>	4	0	<b>Unfavourable-inadequate*</b>

\*Although the monitoring stops passed conservation assessment based on best scientific judgement of the whole habitat

The future prospects of the machair at White Strand are rated as *unfavourable-inadequate*. Fencing has altered the grazing regime on the machair and the majority of it is undergrazed. This means that the typical appearance of short sward grassland has changed to a taller sward. There has also been some improvement, as in places agricultural weeds dominate. The natural functioning of the machair system is therefore no longer occurring. The NATURA 2000 report ranks the machair within the cSAC as a whole as having *average or unfavourable prospects*.

An overall EU conservation status of *unfavourable-bad* is assigned to the machair (Table 180C). This is attributable to the unfavourable-bad structure and functions of this habitat and therefore the poor future prospects at the site.

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

### **Fixed dunes (H2130)**

The extent of the fixed dune is rated as *unfavourable-inadequate*. The fixed dune is a very small area and a road has been built on the habitat, which divides it from the shingle. The fixed dunes at White Strand are not specifically mentioned in the NATURA 2000 report but it states that for the Inishowen peninsula as a whole they are ranked as being of *good representativity*. The report also points out that many of the fixed dune areas within the cSAC (2012) have been damaged by a variety of land-use practices in the recent past, which is the case at White strand.

The structure and functions of the fixed dune are rated as *unfavourable-inadequate*. Although the monitoring stop passed, the overall functioning of the habitat has been compromised as a result of both the road being built and the fact that the habitat has been fragmented. The NATURA 2000 report gives a ranking of *average or partially degraded structure*.

The future prospects for the fixed dune are rated as *unfavourable-inadequate*. The site does not boast a good example of the habitat and agricultural practices on the site do not augur well for its future. The lack of large grazers in some areas of the fixed dunes means that there is undergrazing occurring. The NATURA 2000 report gives a ranking of *average or unfavourable prospects*.

The overall EU conservation assessment is rated as *unfavourable-inadequate* as a result of the extent, structure and functions and inadequate future prospects of the habitat at the site. The overall Irish rating is *unfavourable-declining*.

### **Embryonic dunes (H2110)**

There is an extremely small area of embryonic dunes found at White Strand. The lack of the habitat can be attributed to fact that the site is on a very exposed coastline. The extent is therefore rated as *unfavourable-inadequate*. There is no assessment for embryonic dunes in the NATURA 2000 report, as the habitat is not significantly represented along the Inishowen coastline.

No monitoring stops were placed in the habitat as it was considered too small. However, it was noted that the habitat was quite disturbed with only small patches of the typical grass (*E. juncea*) present. Therefore the structure and functions of the habitat are rated as *unfavourable-inadequate*.

The future prospects for the embryonic dunes are considered to be *unfavourable-inadequate* for the site. There is little possibility that the habitat will build up at this site due the high erosional factors at play.

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

### **Perennial Vegetation of Stony Banks (H1220)**

This habitat is extensive at White Strand, however there has been some loss in area due to the road and from shingle extraction. The extent of the perennial vegetation is therefore rated as *unfavourable-inadequate* (Table 180C). The NATURA 2000 report states that there is *excellent representativity* of the habitat along the coastline of the Inishowen peninsula.

A total of four monitoring stops were placed in the shingle habitat and all passed the monitoring criteria. (Table 180D). The habitat may however be subject to continuing shingle extraction, which will have an affect on the structure of the habitat. Therefore the structure and functions parameter is rated as *unfavourable-inadequate*. The NATURA 2000 report states that although shingle extraction has been a problem in some areas, given the overall extent of the habitat for the whole of the Inishowen peninsula, it ranks the structure of the habitat as *excellent structure*.

The future prospects of this habitat are considered *unfavourable-inadequate* as there may be shingle extraction still occurring at the site. The NATURA 2000 ranks the future prospects as *excellent prospects*.

The overall EU conservation status is rated as *unfavourable-inadequate* for the shingle habitat (Table 180C).

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

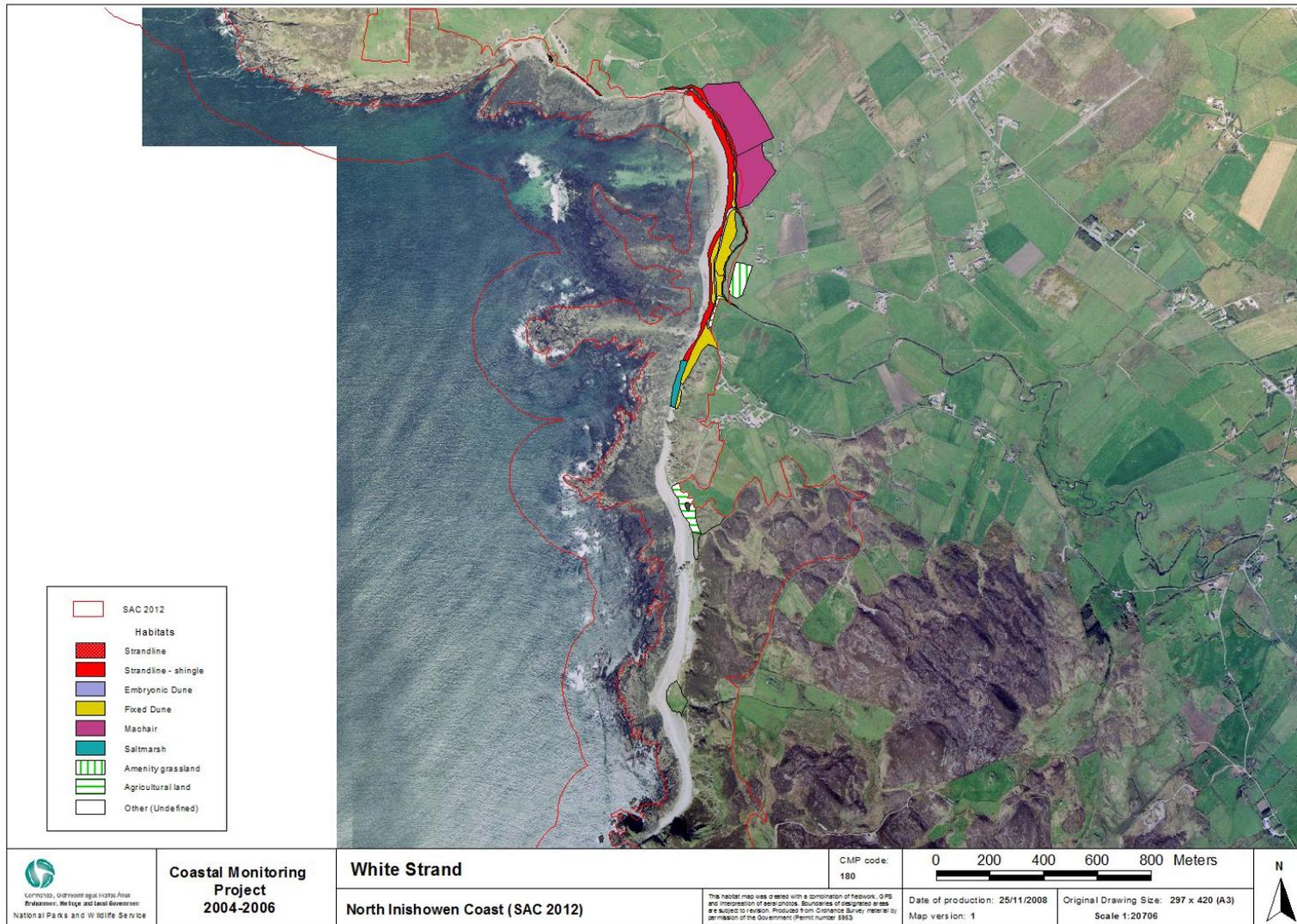
### **Strandline (H1210)**

The habitat is extremely minimal at this site and consisted of a few very small areas therefore, the extent is rated as *unfavourable-inadequate*. There is no assessment for annual strandline in the NATURA 2000 report, as the habitat is not significantly represented along the Inishowen coastline.

The structure and functions of the habitat are rated as *favourable*. This assessment is based on best scientific judgement as no monitoring stops were placed as a result of the small area of habitat. Typical species were present however and there were no negative indicators recorded.

The exposed location of the site will have an affect on the future growth of the habitat. Therefore the future prospects for annual strandline are rated as *unfavourable-inadequate*.

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



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

### **SITE DETAILS**

CMP06 site name: **Culdaff** CMP06 site code: **181** CMP Map No.: **179**

County:**Donegal** Discovery map: **3** Grid Reference: **C449 539**

6 inch Map No.: **Dg 05**

Aerial photographs (2000 series): **O 0022 – A, B, D.**

NPWS Site Name: **North Inishowen Coast**

NPWS designation: **pNHA: 2012 cSAC: 2012**

Ranger Area: **West**

MPSU Plan: **Draft 2 Consultation 2000**

Report Author: **Kieran Connolly**

### **SITE DESCRIPTION**

Culdaff sandhills are in Culdaff Bay, adjacent to the town of Culdaff on the northeast of the Inishowen Peninsula. The dunes extend over little more than 1km of coastline and lie between the headlands of Carrickkeeragh to the north and Dunmore Head to the south. The sandhills are low, rising to no more than approximately 8m above the level of the adjacent fine-grained, sandy beach. Much of the interior of the sandhills is low, falling steeply away from the high, narrow front ridge at the seaward edge of the dunes.

Most of the total sand dune area of 19.505ha, is accounted for by fixed dunes – a priority Annex I habitat – while a narrow fringe of foredune habitats along the seaward edge of the dunes, and a number of dune slacks, comprise most of the remaining habitat. (Table 181A). Scub and dense stands of *Pteridium aquilinum* (Bracken) are a feature of the dune grassland, while a small slatmarsh lies to the south of the dunes, adjacent to Culdaff River channel.

The dunes are part of the North Inishowen Coast cSAC (cSAC 2012), as are six other sand dune sites dealt with in the present report. The six other sites are Crummie’s Bay

(site 175), Lenankeel (site 176), Tullagh (site 177), Doagh Isle (site 178), Lag (site 179) and White Strand (site 180).

Culdaff is one of five Inishowen sites from which machair is reportedly known, although the habitat was not seen during the present survey, nor was it established where it was believed to be present.

**Table 181A** Areas of EU Annex I habitats mapped at Culdaff

<b>EU Code</b>	<b>EU Habitat</b>	<b>Area (ha)</b>
H2110	Embryonic Dunes	0.086
H2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i>	1.033
H2130	Fixed coastal dunes with herbaceous vegetation	18.103
H2190	Humid dune slacks	0.283
	<b>Total Sand dune</b>	<b>19.505</b>

Donegal County Council owns the dunes and various parts have been developed for amenity use. An existing football pitch and clubhouse was extended in 2002, while car parks and a playground occupy other parts of the natural dune area. The car park and football pitch near the centre of the site, and the car park at the western end, are excluded from the cSAC, although the inaccuracy in the mapping of these exclusions can be clearly seen on the site digital map. The total loss of natural fixed dune area to these developments is estimated at 2.59ha, based on polygons drawn around the areas in question, on the site digital map.

Despite the Council ownership of the dunes, there has been a recent history of stock grazing – apparently through leasing agreements with local farmers – although the current vegetation structure of the dunes suggests that grazing has now been discontinued.

The Culdaff River cuts a wide channel along the southwest side of the sandhills before entering Culdaff Bay at the west end of the site. The course of the river channel has created a backstrand that is currently fringed by a narrow band of foredune habitat.

The site is readily accessed via public roads, and attracts considerable numbers of users. Two large car parks, one near the centre of the dunes, and another to the east, provide for large numbers of visitors.

### **Machair (H21AO)**

Culdaff is among the sites listed as having a machair component in the NPWS sand dune site inventory. However, the habitat was not noted during the current survey, nor is it clear from the site file information where the habitat was previously reported to exist. Gross habitat maps in the cSAC files do not indicate machair at Culdaff.

The only machair sites specifically discussed in the North Inishowen Coast cSAC Conservation Plan (MPSU plan) are Doagh Isle and Tullagh Point (Rockstown Harbour).

### **Fixed Dunes (H2130)**

Much of the fixed dune area has a long, ungrazed sward with low species diversity, reflecting the current undergrazed condition of the dune grassland. There are few areas with short turf, and most of these are on, or adjacent to, pedestrian tracks. The presence of a considerable rabbit population is probably a positive factor in maintaining the short turf there is, although even in the most extensive of the short turf areas, species diversity is not particularly high. Nevertheless, several typical fixed dune species were noted, among the most common of which were *Anacamptis pyramidalis* (Pyramidal orchid), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Common Bird's-foot trefoil), *Plantago lanceolata* (Ribwort plantain), *Primula vulgaris* (Primrose), and *Trifolium repens* (White clover).

Also common in the dune grassland was *Centaurea nigra* (Common Knapweed), while other, less common species, included *Angelica sylvestris* (Wild angelica), *Fragaria vesca* (Wild strawberry) and *Phyllitis scolopendrium* (Hart's-tongue fern). Also noted towards the rear (landward edge) of the fixed dunes and particularly in *Pteridium aquilinum* (Bracken)-dominated parts of the dunes, was *Teucrium scordonia* (Wood sage).

Moss cover was high throughout much of the fixed dunes and the most commonly noted species were *Climacium dendroides*, *Hylocomium splendens*, *Rhytidiadelphus squarrosus*, *R. triquetrus* and *Scleropodium purum*. *Rhytidiadelphus triquetrus* was extremely common in places, particularly on hummocks, and dominated at least one of the fixed dune monitoring stops.

Dense stands of scrub, and trees of stunted growth form are a prominent feature of the fixed dunes. A number of particularly dense stands of scrub species and small trees were mapped on the site digital map. Elsewhere, less dense stands of scrub species, particularly *Prunus spinosa* (Blackthorn), appear to be spreading, in the absence of any grazing pressure to check their progress.

### **Dune Slacks (H2190)**

A number of dune slacks, most of which are located in the western half of the fixed dunes, were mapped at the site. The slacks at the site are of a wet type, and in some cases had standing water on the site survey date. The largest and most easterly of the mapped slacks appeared to have been either artificially created or greatly modified by the cutting of a drain from the adjacent football pitch. A swathe of *Rorippa nasturtium-aquaticum* (Water-cress) marks the location of the drain. The south end of the slack is dominated by *Urtica dioica* (Common nettle), while *Cirsium arvense* (Creeping thistle) and *Arrhenatherum elatius* (False oat-grass), both of which are also included on the dune slack negative indicator species list, were present. It may be that the drain is supplying nutrient-rich run-off from the improved football field, thereby promoting the spread of nitrophilous species. The lack of previous information on the site makes it difficult to assess the recent history of the habitat here. The low-lying nature of this area suggests there may have been a naturally formed slack here, prior to the construction of drains through the dunes.

In the wetter parts of the most westerly slack (where the first dune slack monitoring stop was carried out), standing water was present in the lower-lying areas. Within the wettest part were a number of *Salix (cinerea-type)* shrubs, up to 4m tall, and a stand of *Sparganium* sp. (Bur-reed). The rest of this slack was dominated by *Carex nigra*

(Common sedge), while the other slack on the west side of the site was dominated by *Filipendula ulmaria* (Meadowsweet).

Among the most commonly noted species in the slacks were *Calliergonella cuspidate*, *Carex arenaria* (Sand sedge), *C. flacca* (Glaucous sedge), *C. nigra* (Common sedge), *Hydrocotyle vulgaris* (Marsh pennywort), *Potentilla anserina* (Silverweed), and *Prunella vulgaris* (Selfheal).

### **Mobile Dunes (H2120)**

A narrow band of mobile dunes was present along the full length of the seaward edge of the dunes. Characterised by the presence of *Ammophila arenaria* (Marram), most of the habitat was confined to the steeply sloping front face of the dunes. At the western edge of the site, a broader band of habitat, much of which appeared to be accreting on the flatter beach area, was mapped. Recreational pressures, particularly in and around the car parking areas are leading to localised trampling and erosion of the mobile dunes.

A narrow fringe of mobile dune, dominated by *Ammophila arenaria* (Marram), was also mapped along the backstrand. Like the embryonic dune habitat noted here, it owes its presence to the action of the Culdaff River in creating a certain amount of reworked sediment in the backstrand area. The presence of a considerable cover of unhealthy *Ammophila arenaria* (Marram) confirmed the lack of sediment mobility in this area.

A small patch of *Ammophila arenaria* (Marram) on the east side of the Culdaff River, was also noted and mapped. This area was not visited, as the River channel was not passable during the site visit, and the mapping was based on a sketch drawn on the site aerial photograph.

### **Embryonic dunes (H2110)**

There was no embryonic dune habitat along the front shore of the dune system. A narrow strip of vegetation, along much of the length of the backstrand, was dominated by *Elytrigia juncea* (Sand couch), and consequently mapped as embryonic dune. However, it was clearly not part of a typical dune building system, in which strandline

and foredune vegetation accumulates at the seaward edge of dunes as onshore winds blow sediment in a landward direction. Its presence may be attributed to a localised recycling of sediment, caused by the action of the Culdaff River through the wide channel that runs along the backstrand area, before entering the sea at the north end of the site. The vegetation here was of a rather rank nature, reflecting the inherent lack of mobility of sediment in the area.

There were no strandline (driftline) habitats present at the site.

## IMPACTS

Activities observed or known to be impacting on the sand dune habitats at Culdaff are shown in Table 181B.

**Table 181B** Intensity and impact of various activities on sand dune habitats at Culdaff

EU Habitat Code <sup>1</sup>	Activity Code <sup>2</sup>	Intensity <sup>3</sup>	Impact <sup>4</sup>	Area affected/ha	Location of Activity <sup>5</sup>
H2130	140	C	+1	10	Inside
H2130	149	B	-1	12	Inside
H2130	421	C	-1	1.0	Inside
H2130	608	A	-1	1.0	Inside
H2120	622	B	-1	0.5	Inside
H2130	622	C	+2	8	Inside
H2130	622	C	-1	15	Inside
H2130	954	A	-1	1.5	Inside

<sup>1</sup>EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.

<sup>2</sup>Description of activity codes are found in Appendix 3

<sup>3</sup>Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.

<sup>4</sup>Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence

<sup>5</sup>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 are impacting the sand dune habitat

Although the dunes are owned by Donegal County Council, they have previously been leased for grazing (McKenna *et al.*, 2005). However, the long, rather rank nature of much of the sward and the generally low species diversity throughout the grassland, suggests that grazing has now been discontinued. Undergrazing in the dune grassland (code 149) now represents one of the major management issues at the site.

Rabbits (140) are present at the site – its former status as a rabbit warren is indicated on the site 6' map – and in the absence of any obvious signs of damage from their

activities, may be regarded as a positive influence in maintaining short turf in some areas.

There are several areas of quite dense scrub (code 954) throughout the site, a number of which are mapped on the site digital map. Information points, included in the 'miscellaneous' theme on the site digital map, mark some smaller scrub areas. The most widespread scrub species throughout the fixed dunes is *Prunus spinosa* (Blackthorn), which forms both dense stands and also more scattered clumps. Other species forming part of the scrub flora or growing as isolated trees or shrubs include *Acer pseudoplatanus* (Sycamore), *Fraxinus excelsior* (Ash) and *Ulex europaeus* (Gorse). Several of the scrub areas also have a considerable *Pteridium aquilinum* (Bracken) component. A large stand of *Crocsmia x crocosmiiflora* (Montbretia) was also noted in a damp hollow.

Recreational use of the site is probably quite high: walking, kite flying and water sports (code 622) were among the activities observed during the site visit. On the survey date, which was not a particularly fine day, there were in excess of 40 people on the beach in the afternoon. There is a small mobile home park to the east of the dunes, which probably adds to the amenity pressure on the dunes. There are a number of pedestrian tracks through the fixed dunes, although they are generally not bare or badly worn. In the absence of stock grazing at the site, walking may have a positive influence in creating and maintaining short turf areas in the fixed dunes. Near the centrally located car park, however, there are a number of worn paths through mobile dunes and fixed dunes.

Although there are no official camping or caravan areas (code 608) within the site, there were several tents pitched in the easternmost part of the fixed dunes on the survey date. Campfires and littering (code 421) were also noted in the area. The location is marked with 'miscellaneous' point on the site digital map. A single tent, pitched in what appeared to be a well-used site in the fixed dunes in the west side of the site, was also noted.

A sizeable portion of the natural fixed dune area has been lost to amenity developments (code 400) at the site. An upgrade and extension to the football

facilities was completed in 2002, and other areas have been lost to cat parks and a playground. The total loss of dune habitat is estimated here (by mapping the developments and generating area data on the site digital map) as 2.59ha.

The largest of the dune slacks mapped at the site may have been created artificially as a result of drainage operations connected with the football fields. It may, on the other hand, have already existed as a slack, but been modified as a result of drainage works. In either scenario, the drainage works (code 810) should be viewed as a negative impact, as there appears to have been a certain amount of enrichment in the slack area, resulting in the spread of nitrophilous weed species, possibly due to leaching and run-off of fertilisers from the football fields.

## **CONSERVATION STATUS**

The overall conservation status assessment of each habitat at Culdaff is based on a combination of *Habitat Extent, Structure & Functions*, and *Future Prospects* assessments (Table 181C). Details of the numbers and pass/failure rates of monitoring stops used to assess habitat structure & functions are shown in Table 181D.

There were no previous data with which the current results may be compared for the purposes of assessing habitat conservation status. Habitat extent data in the relevant NATURA 2000 data form refers to the cSAC as a whole, which in this case encompasses seven of the sites included in the present report, and is therefore of little use in evaluating changes from previous conditions. Other observations made in previous reports also tend to focus on the larger sites within the cSAC, such as Doagh Isle and Lag, to the exclusion of the smaller sites like Culdaff. For these reasons, conservation status of habitats is largely based on the current condition of habitats, and relies on the judgement of the report author.

### **Fixed Dunes (2130)**

As there are no data to suggest a recent loss of area (extent) in the fixed dunes, that aspect of conservation status is rated as *favourable*. Comparison with the site 6' map (included as a theme on the site digital map) shows a re-contouring of the dunes, but such is the age of the map (possibly well in excess of 100 years), that it is considered

irrelevant for the purposes of comparison with the present map. Several long episodes of accretion and retreat may have occurred over the time frame involved.

Of the seven monitoring stops carried out, five passed, and two failed the overall attribute criteria (Table 181D). The percentage of failed stops exceeds 25% and indicates *unfavourable-bad* structure and functions. Both of the failed stops had an excessively long sward height, while one also had an excessive cover of negative indicator species, and the other a lack of typical species. Bracken, *Pteridium aquilinum*, accounted for the negative indicator species component of one of the failed stops, while another stop, which passed on all other criteria (and was therefore an overall pass) had a 40% cover of *Prunus spinosa* (Blackthorn). Most of the stops, including some that passed the overall required standard, failed the prescribed sward height criterion, reflecting the lack of stock grazing at the site.

As the fixed dunes have seen various developments such as car parks and football facilities and are currently undergrazed, the future prospects of the habitat must be considered less than ideal. Although County Council ownership might be considered as positive in providing protection from potentially damaging impacts such as intensive agriculture, it is clear that amenity and development pressures are impacting negatively on the site. As the current threats to the habitat are probably fairly severe, and the habitat is likely to continue to decline, the most appropriate rating is *unfavourable-bad*.

The overall condition of the habitat is *unfavourable-bad*, as two of the individual components of the assessment (structure & functions and future prospects) are also *unfavourable-bad*.

The most appropriate rating under the proposed Irish conservation status system is *unfavourable-declining*, based largely on the assumption that negative factors such as scrub encroachment and unmanaged recreational use have been continued over time.

## Mobile Dunes (H2120)

As is the case with the other habitats at the site, there are apparently no data with which the current extent of mobile dunes can be adequately compared. As a band of habitat is present across the entire length of the site, zonation may be considered as good, and extent *favourable*. It should be noted that most of the mapped area of mobile dunes is currently confined to the steeply sloping front face of the dunes, and is apparently not accreting. An exception to this is the west tip of the dunes, where the broad band of mobile dunes includes considerable portions that appear to have recently accreted. However, this part of the site is probably inherently more dynamic than elsewhere, and an adjacent eroding area (just to the south of the tip, where the backstrand begins) bears testimony to this.

**Table 181C** Conservation status of Annex I sand dune habitats at Culdaff

Habitat <sup>1</sup>	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system <sup>2</sup>
	Favourable	Unfavourable - Inadequate	Unfavourable - Bad		
Fixed Dunes (H2130)	Extent		Structure & functions/ Future Prospects	Unfavourable - Bad	Unfavourable - Declining
Embryonic Dunes (H2110)		Structure & functions	Extent/ Future Prospects	Unfavourable - Bad	Unfavourable- Unchanged
Mobile Dunes (H1220)	Extent	Future Prospects	Structure & functions	Unfavourable - Bad	Unfavourable- Unchanged
Dune Slack (H2190)	Extent	Structure & functions/ Future Prospects		Unfavourable - Inadequate	Unfavourable- Unchanged

<sup>1</sup>EU Codes as per Interpretation Manual

<sup>2</sup>Ratings are Favourable (Enhanced, Maintained, Recovered, Declining), Unfavourable (Recovering, Unchanged, Declining) and Destroyed (Partially destroyed, Completely destroyed and Unknown)

Of the five monitoring stops carried out in the mobile dunes – including four along the front (seaward) face of the dunes and one in the backstrand area – three passed and two failed the overall standard, indicating *unfavourable-bad* structure and functions (Table 181D). All stops had a sufficient cover of *Ammophila arenaria* (Marram) and little or no negative indicator species cover. However, an excessive cover of unhealthy *A. arenaria* brought about the overall failure of two stops. On eof

the failed stops was that from the backstrand area, confirming the lack of mobility in this inherently less dynamic zone.

The fairly constant, but low-level occurrence of *Senecio jacobaea* (Common Ragwort) throughout the habitat was reflected in one of the monitoring stops. However, as was typical of the site, the percentage cover was not high enough to result in a failed stop.

**Table 181D** Monitoring stop totals and pass/failure rates of Annex I sand dune habitats at Culdaff

Habitat	Monitoring stops		Conservation status
	Pass	Fail	
Fixed dunes (H2130)	4	3	Unfavourable- bad
Embryonic Dune (H2110)	0	1	Unfavourable- bad
Mobile Dunes (H2120)	3	2	Unfavourable- bad
Dune Slack (H2190)	2	0	Favourable*

\*Modified to *unfavourable-inadequate* (see below)

The future prospects of the mobile dunes, in the face of apparently increasing recreational pressures, must be considered *unfavourable-inadequate*. Damage to the mobile dunes in and around the areas of highest recreation pressures illustrates the less than ideal condition of the habitat. Sand extraction is believed to have been an historical feature of the site (McKenna *et al.*, 2005), although it appears this is no longer an important factor.

A combination of *favourable*, *unfavourable-inadequate* and *unfavourable-bad* assessments indicates an overall *unfavourable-bad* assessment for conservation status.

The corresponding Irish conservation status assessment thought most appropriate is *unfavourable-unchanged*, as the current condition of the mobile dunes is assumed to have existed for some time.

### **Embryonic dunes (H2110)**

The absence of embryonic dunes from almost the entire site, including the front seaward edge of the dunes, suggests that *unfavourable-bad* is the most appropriate assessment for habitat extent.

The only embryonic dune type habitat present was a narrow fringes along the backstrand (on the landwards side of the fixed dunes). As this is not part of a typical dune building scenario, it may be considered largely incidental in the wider context of the functioning of the whole system. However, a monitoring stop, which failed the overall target criteria due to an excess of unhealthy *Elytrigia juncea* (Sand couch), was carried out, confirming the inherent lack of mobility in the zone, and the fact that the appropriate structure and functions assessment is *unfavourable-bad*.

Future prospects are considered *unfavourable-inadequate*, due to the relatively intense recreational pressures that exist at the site.

A combination of *unfavourable-inadequate* and *unfavourable-bad* assessments dictates an overall *unfavourable-bad* assessment for the habitat.

The corresponding Irish conservation status assessment thought most appropriate is *unfavourable-unchanged*, as the habitat has probably been in a similar condition for some time.

### **Dune Slacks (H2190)**

As there are apparently no previous data on dune slacks at Culdaff (the habitat is not included among the known Annex I habitats in the NATURA 2000 standard data form), extent (area) is rated as *favourable*. Several slacks were noted in the sandhills, and there were no indications of recent loss of area to damage or development.

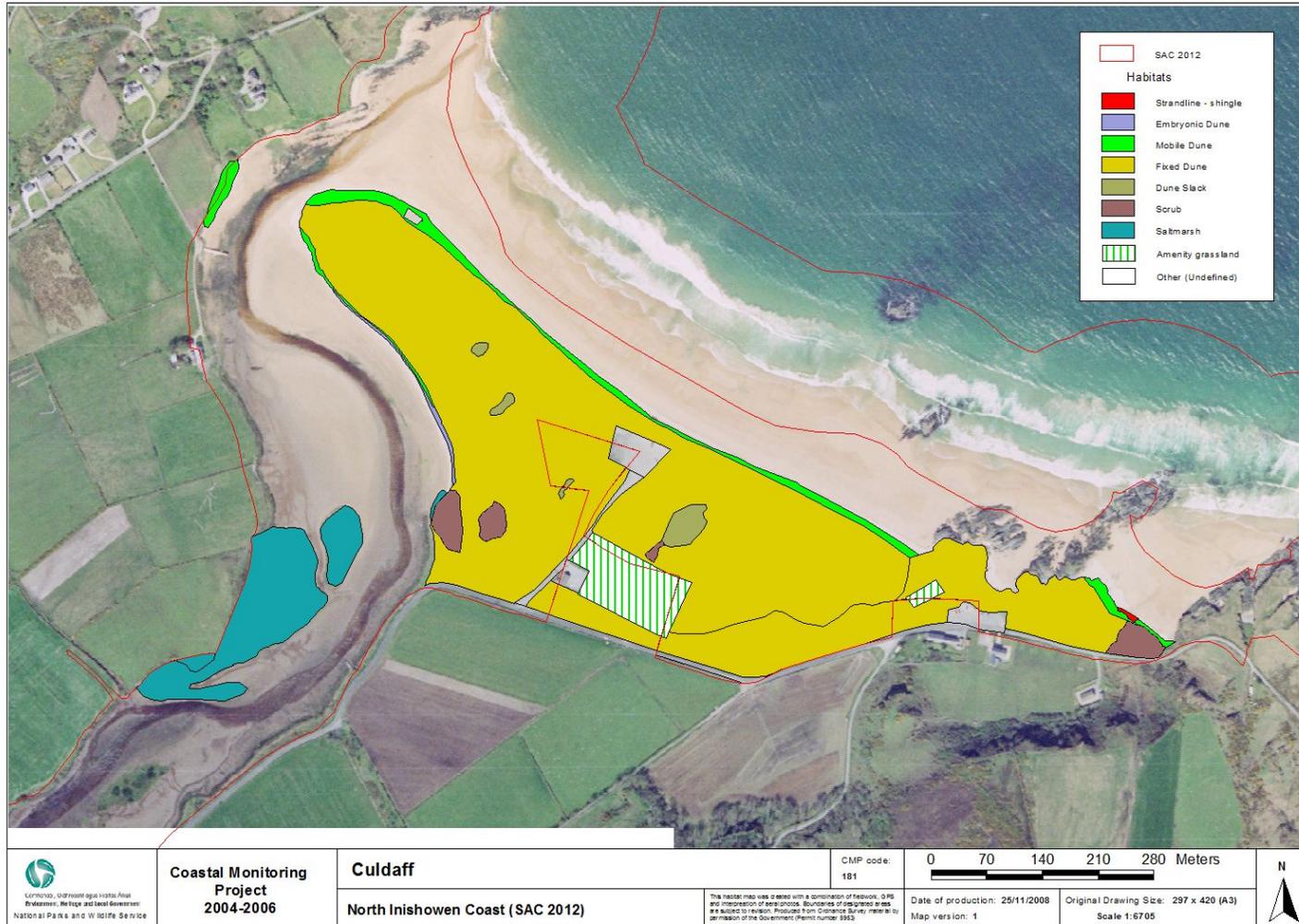
Both of the monitoring stops carried out in dune slacks passed the overall required standard, indicating *favourable* structure and functions. In both monitoring stops, all of the attribute targets were comfortably met, and there was a total absence of negative indicator species. Monitoring stops were not carried out in the large slack adjacent to the football pitch, on the assumption that it was artificially created during

drainage works associated with the football grounds. However, the topography here suggests that a slack may have existed before the drain was excavated, in which case the drainage works should be considered as damage to the habitat, and the preponderance of negative indicator species should be considered as undermining the structure and functions assessment of the habitat. For this reason, the assessment considered most appropriate is *unfavourable-inadequate*.

Future prospects for the habitat cannot be considered as assured, due partly to the fact that developments such as playgrounds and football pitches have already taken place in the dunes, and amenity pressures appear to have grown in recent times. As the habitat is not under severe impact from threats and rapidly declining (which would indicate *unfabvourable-bad* future prospects), the appropriate rating is *unfavourable-inadequate*.

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

The corresponding Irish conservation status assessment thought most appropriate is *unfavourable-unchanged* as the negative aspects of the habitat conservation status have probably existed for some time.



# Appendix X– Crummies Bay site report and habitat maps from the Sand Dunes Monitoring Project (Delaney *et al.*, 2013)

## SITE 175 CRUMMIES BAY

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

Crummies Bay is a small site located close to Buncrana, Co. Donegal and is included within the North Inishowen Coast SAC (SAC 002012). The sand dune habitats at Crummies Bay account for 0.18% of the total area of the SAC (NPWS, 1999). During the baseline survey the following habitats **1210 Annual vegetation of drift lines**, **2110 Embryonic shifting dunes**, **2120 Marram dunes (white dunes)**, **\*2130 Fixed dunes (grey dunes)** and **\*2140 Decalcified *Empetrum* dunes** were recorded at the site (\* indicates a priority habitat) (Ryle *et al.*, 2009). The dunes form part of a complex mosaic with native woodland, marsh and freshwater habitats. The Annex I habitats **1230 Vegetated sea cliffs of the Atlantic and Baltic coasts** and **4030 European dry heaths** are closely associated with the sand dune habitats here. The site is used as an amenity by locals and tourists, and there is a path leading through the dunes to the beach. There is some trampling and disturbance directly associated with the path. The main local land use is agriculture.

### 2 CONSERVATION ASSESSMENTS

#### 2.1 Site overview

Crummies Bay was surveyed on the 28th of May 2012. Five Annex I habitats were recorded at Crummies Bay during the baseline survey, but only three were recorded in 2012. **\*2140 Decalcified *Empetrum* dunes** had been mapped on a rocky outcrop which does not correspond to the description of the Annex I habitat (Commission of the European Communities, 2007) and was mapped as dry heath in the revised baseline survey. **1210 Annual vegetation of drift lines** was not present on the site in 2012, but as this is an ephemeral habitat (Rodwell *et al.*, 2000), the absence of the habitat was not considered a

negative development. Table 1 shows the habitats that were assessed at Crummies Bay and the results of the Conservation Assessments.

**Table 1.** Conservation status assessment results for all Annex I dune habitats surveyed at Crummies Bay, Co. Donegal

Habitat	Area	Structure & Functions	Future Prospects	Overall result
2110 Embryonic shifting dunes	Favourable (Improving)	Favourable (Stable)	Unfavourable-Inadequate (Deteriorating)	Unfavourable-Inadequate (Stable)
2120 Marram dunes (white dunes)	Favourable (Stable)	Favourable (Improving)	Favourable (stable)	Favourable (Improving)
*2130 Fixed dunes (grey dunes)	Favourable (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Bad (Deteriorating)	Unfavourable-Bad (Deteriorating)

### 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 revised baseline area for total Annex I sand dune habitat at Crummies Bay (12.56 ha) is less than the original baseline area (14.53 ha). This is due to the reclassification of some of the **\*2140 Decalcified *Empetrum* dunes** and **\*2130 Fixed dunes (grey dunes)** as heath. The **\*2130 Fixed dunes (grey dunes)** have increased in area at the expense of the **2120 Marram dunes (white dunes)**. **1210 Annual vegetation of drift lines** was not present on the site in 2012.

**Table 2.** Areas of Annex I dune habitats originally mapped at Crummies Bay during the baseline survey (Coastal Monitoring Project), the revised baseline areas and areas mapped during the Sand Dune Monitoring Project in 2012.

Habitat	Baseline survey (ha)	Revised baseline (ha)	Sand Dunes Monitoring Project (ha)
1210 Annual vegetation of drift lines	0.10	0.10	0.00
2110 Embryonic shifting dunes	0.09	0.09	0.15
2120 Marram dunes (white dunes)	0.46	0.46	0.38
*2130 Fixed dunes (grey dunes)	13.85	11.89	11.95
*2140 Decalcified <i>Empetrum</i> dunes	0.03	0.02	0.00
<b>Total</b>	<b>14.53</b>	<b>12.56</b>	<b>12.48</b>

### 2.1.2 Structure and Functions

Structure and Functions were assessed for three habitats at Crummies Bay. 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.

**Table 3.** Annex I sand dune habitats at Crummies Bay 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	2	7	0
2120 Marram dunes (white dunes)	4	7	0
*2130 Fixed dunes (grey dunes)	8	11	2

The Structure and Functions of **2110 Embryonic shifting dunes** and **2120 Marram dunes (white dunes)** were assessed as Favourable, but **\*2130 Fixed dunes (grey dunes)** were assessed as Unfavourable-Inadequate because the habitat failed on two criteria in the Structure and Functions assessment: excessive sward height and scrub encroachment.

### 2.1.3 Future Prospects

Impacts and activities recorded at Crummies Bay are presented in Table 4. Impact codes are assigned according to Ssymank (2010). **2120 Marram dunes (white dunes)** had no significant negative impacts and were therefore assessed as Favourable. The presence of campfires caused **2110 Embryonic shifting dunes** to be assessed as Unfavourable-Inadequate and a combination of lack of grazing, intensive grazing, scrub and bracken encroachment, trampling and campfires caused **\*2130 Fixed dunes (grey dunes)** to be assessed as Unfavourable-Bad. The most serious negative impact affecting the site is lack of grazing.

**Table 4.** Impacts recorded in Annex I sand dune habitats at Crummies Bay in 2012. Source refers to whether the impact being scored originates inside or outside the Annex I habitat being assessed.

Habitat code	Impact code	Impact description			Percent of habitat	
2110	G01.02	Walking	Low	Neutral	1	Inside
2110	G05	Campfire	Medium	Negative	1	Inside
2110	H05.01	Litter	Low	Negative	1	Inside
2110	K01.01	Erosion	High	Neutral	10	Inside
2120	G01.02	Walking	Low	Neutral	1	Inside
2120	I01	<i>Acer pseudoplatanus</i> regeneration	Low	Negative	1	Inside
2120	K01.01	Erosion	High	Neutral	20	Inside
*2130	A04.01.02	Intensive sheep grazing	Medium	Negative	15	Inside
*2130	A04.02.02	Non-intensive sheep grazing	Medium	Positive	15	Inside
*2130	A04.03	Undergrazing	Low	Negative	70	Inside
*2130	G01.02	Walking	Low	Positive	1	Inside
*2130	G01.03.02	Tractor paths	Low	Negative	1	Inside
*2130	G05	Campfires	High	Negative	1	Inside
*2130	G05.01	Trampling	High	Negative	1	Inside
*2130	I01	<i>Acer pseudoplatanus</i> regeneration	Low	Negative	1	Inside

*2130	I02	Bracken encroachment	Medium	Negative	5	Inside
*2130	K01.01	Erosion	High	Neutral	1	Inside
*2130	K02.01	Scrub encroachment	Medium	Negative	15	Inside

## 2.2 Annex I habitat assessments

The conservation status of the Annex I habitats at Crummies Bay is discussed below. The present conservation status in 2012 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 2012 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 **1210 Annual vegetation of drift lines** was found in 2012. During the baseline survey, this habitat was found in two discrete bands, one in the south and one in the north of the site. The southern part is no longer vegetated and the northern part has developed into **2110 Embryonic shifting dunes** and **2120 Marram dunes (white dunes)**. There are currently no impacts or activities present that would prevent the development of **1210 Annual vegetation of drift lines** at Crummies Bay.

### 2.2.2 2110 Embryonic shifting dunes

**2110 Embryonic shifting dunes** are closely associated with **2120 Marram dunes (white dunes)** at Crummies Bay. In the north of the site, a small river has changed its course since 2006 and sand has been deposited on an old channel. The sand supports a mosaic of **2110 Embryonic shifting dunes** and **2120 Marram dunes (white dunes)**. Embryonic dunes were mapped where they formed the dominant component of the mosaic, and the rest of the area was mapped as **2120 Marram dunes (white dunes)**.

#### Area

The area of **2110 Embryonic shifting dunes** increased from 0.09 to 0.15 ha since the baseline survey and this is due to the colonisation of newly deposited sand. Area was assessed as Favourable (improving). This is an improvement on the baseline conservation assessment of Unfavourable-Inadequate.

#### Structure and Functions

Two monitoring stops were recorded in **2110 Embryonic shifting dunes** at Crummies Bay, with all criteria passing. Structure and Functions were assessed as Favourable during the baseline project and as Favourable (stable) in 2012.

#### Future Prospects

Campfires are the most serious negative impact in this habitat as they destroy the vegetation where they are lit. They represent a medium-intensity negative impact, but they affect less than 1% of the habitat here. Litter is also a negative impact, but it is of low intensity and

covers less than 1%. Erosion is a natural process of coastal habitats and is not seen as a negative impact. The habitat was assessed as Unfavourable-Inadequate due to the lighting of campfires. During the baseline survey, Future Prospects were assessed as Unfavourable-Inadequate because of the poor zonation of the habitat. Under the current assessment criteria, diffuse habitat boundaries at this site are considered to form part of natural habitat succession and dune building, and therefore Future Prospects would have been assessed as Favourable. Future Prospects were assessed as Unfavourable-Inadequate (deteriorating) in 2012.

#### Conservation assessment

Area and Structure and Functions were assessed as Favourable, but the presence of campfires and littering caused Future Prospects to be assessed as Unfavourable-Inadequate. **2110 Embryonic shifting dunes** at Crummies Bay were assessed as Unfavourable-Inadequate during the baseline project and as Unfavourable-Inadequate (stable) in 2012.

#### 2.2.3 2120 Marram dunes (white dunes)

**2120 Marram dunes (white dunes)** are present in a mosaic with **2110 Embryonic shifting dunes** on newly colonised land on the northern side of Crummies Bay. Only the part of this area which was dominated by *Ammophila arenaria* was considered to be within this habitat and the rest was mapped as **2110 Embryonic shifting dunes**. There was also a long thin stretch of **2120 Marram dunes (white dunes)** along the seaward edge of the southern part of the site.

#### Area

Area was assessed as Favourable during the baseline project. The area of **2120 Marram dunes (white dunes)** has decreased from 0.46 to 0.38 ha since then. This decrease is due to the succession from **2120 Marram dunes (white dunes)** to **\*2130 Fixed dunes (grey dunes)**. As this is a natural process, Area of **2120 Marram dunes (white dunes)** was assessed as Favourable (stable).

#### Structure and Functions

The Structure and Functions of **2120 Marram dunes (white dunes)** were assessed on the basis of four monitoring stops. Flowering was rare, but as the site was surveyed prior to the flowering season for *Ammophila arenaria* and there were plenty of green shoots, the health of the habitat was considered to be good. This represents an improvement since the baseline survey when the presence of unhealthy *Ammophila arenaria* caused it to be assessed as Unfavourable-Bad. There is evidence of an increase in sediment mobility prior to the Sand Dune Monitoring Project, and this may have contributed to the improved condition of the habitat. Structure and Functions were assessed as Favourable (improving) in 2012.

#### Future Prospects

Future Prospects were assessed as Unfavourable-Inadequate during the CMP due to erosion and sediment depletion. Under the current assessment criteria this would not cause the habitat to be assessed unfavourably unless the erosion and sediment depletion were linked to

anthropogenic influences, which were not indicated. Walking and erosion were recorded as neutral impacts on the **2120 Marram dunes (white dunes)** during the SDM. The presence of an *Acer pseudoplatanus* seedling represents a low, negative impact affecting less than 1% of the habitat. Given the limited area and low intensity, this was not considered to be a significant impact, and Future Prospects were assessed as Favourable (stable).

#### Conservation assessment

The Area, Structure and Functions and Future Prospects assessments are Favourable, so the conservation status of **2120 Marram dunes (white dunes)** at Crummies Bay is Favourable (improving). This is a substantial improvement since the baseline survey when the habitat was assessed as Unfavourable-Bad.

#### 2.2.4 \*2130 Fixed dunes (grey dunes)

The **\*2130 Fixed dunes (grey dunes)** present at Crummies Bay are mainly located to the south of the stream that runs through the site. There are some isolated areas of **\*2130 Fixed dunes (grey dunes)** to the north of the stream. One is located at the front of the dune system and the other is separated from the rest of the system by woodland, scrub and marsh.

#### Area

Area was assessed as Favourable during the CMP. There has been a slight increase in area from 11.89 to 11.95 ha since the baseline survey and Area was assessed as Favourable (stable) in 2012.

#### Structure and Functions

**\*2130 Fixed dunes (grey dunes)** failed two of the Structure and Functions assessment criteria. The sward in two of the eight stops assessed was between 2 and 10 cm in height, and the sward in all of the other stops was taller, indicating that lack of grazing has had a negative effect on the structural diversity of the dune vegetation. Scrub covers 13% of the **\*2130 Fixed dunes (grey dunes)**. As a result, **\*2130 Fixed dunes (grey dunes)** was assessed as Unfavourable-Inadequate (stable). This is comparable to the baseline habitat assessment.

#### Future Prospects

The most significant negative impact is undergrazing, which is of low intensity and affects 70% of the habitat. Campfires and trampling have a high impact, but each affects less than 1% of the habitat. Intensive sheep grazing and scrub encroachment each have a medium-intensity effect on 15% of the habitat, while bracken encroachment has a negative, medium intensity effect on 5%. Driving in the habitat has a low-intensity negative effect on less than 1% of the habitat. Extensive sheep grazing has a medium-intensity positive impact on 15% of the habitat, but this is not enough to outweigh the effects of undergrazing and the habitat fails the Future Prospects assessment with a score of Unfavourable-Bad (deteriorating). This is more negative than the baseline assessment and indicates that the lack of grazing represents an increasing threat and one that could result in the replacement of herbaceous vegetation on the fixed dunes with scrub.

### Conservation assessment

Conservation status of **\*2130 Fixed dunes (grey dunes)** was assessed as Unfavourable-Inadequate during the baseline project. In 2012, Area was assessed as Favourable, Structure and Functions as Unfavourable-Inadequate and Future Prospects were assessed as Unfavourable-Bad. **\*2130 Fixed dunes (grey dunes)** was assessed as Unfavourable-Bad (deteriorating) in 2012.

#### 2.2.5 *\*2140 Decalcified Empetrum dunes*

A small area (0.02 ha) of **\*2140 Decalcified *Empetrum* dunes** was mapped during the baseline survey. Although *Empetrum nigrum* was found here in 2012, it was growing on a rocky outcrop and not on decalcified sand. It was therefore mapped as dry coastal heath.

## 3 DISCUSSION

### 3.1 Recreation

Trampling, litter and campfires represent negative impacts at Crummies Bay. Although they affect a small area, trampling and campfires can both cause blowouts to occur and campfires can spread to adjacent vegetation. Encouragement of visitors to use the dunes in a sensitive manner would be of benefit to the site as a whole.

### 3.2 Agriculture

The site is partly grazed by sheep, but much of the **\*2130 Fixed dunes (grey dunes)** vegetation suffers from a lack of grazing. The most appropriate land use here is extensive grazing without the use of fertilizer or reseeding and the stocking density should be adequate to maintain a short sward (2-10 cm) in 30% to 70% of the site.

### 3.3 2180 Wooded dunes of the Atlantic, Continental and Boreal region

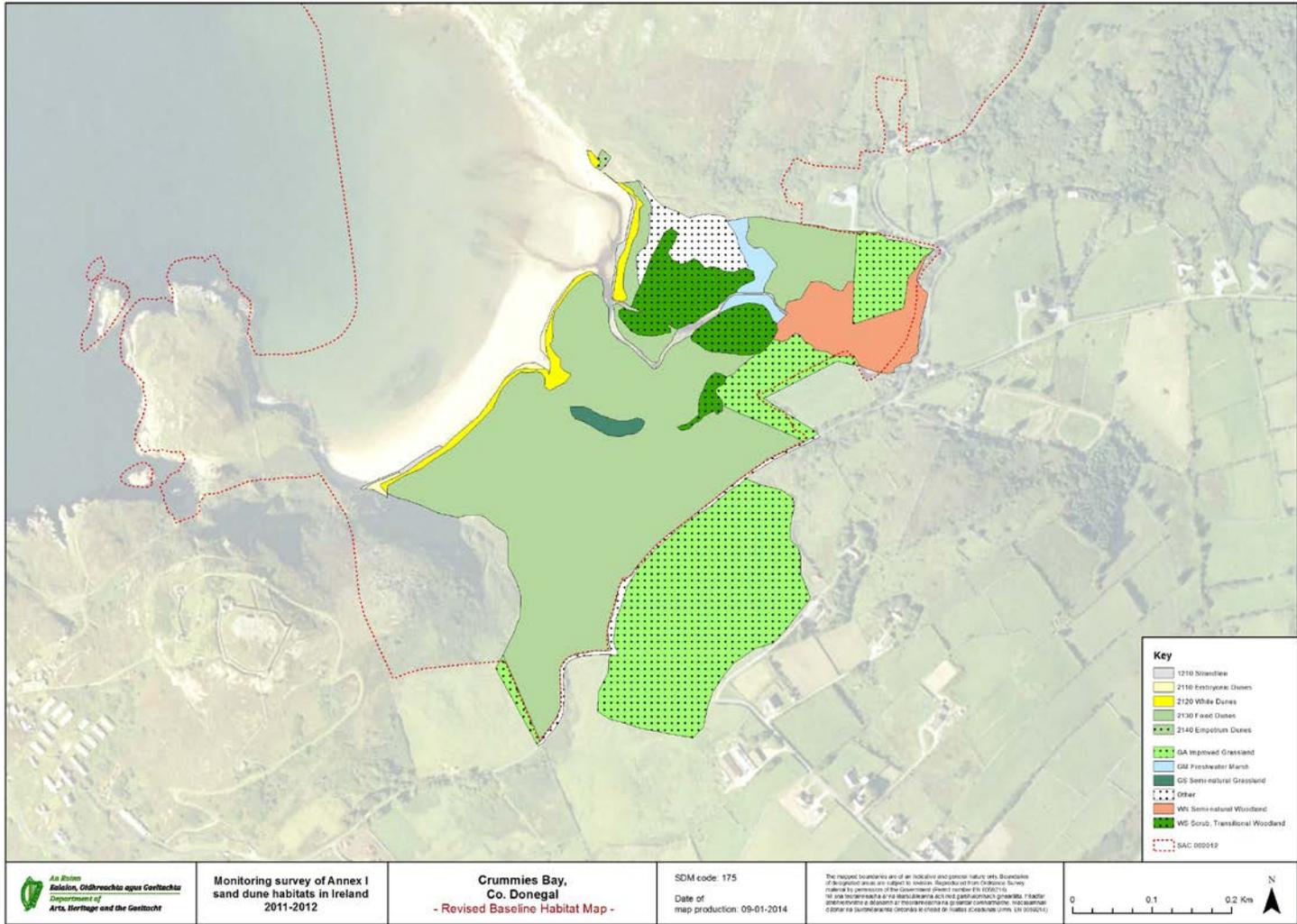
Scrub is frequent on the site, both on the dunes and on adjacent land. There is also an area of native woodland close to the stream in the northern part of the site. This area should be investigated, as it could conform to **2180 Wooded dunes of the Atlantic, Continental and Boreal region** if it is occurring on sand. This habitat has not been recognised as occurring in Ireland. If the wood at Crummies Bay does occur on sand dunes, then the dense adjacent scrub may represent a succession to **2180 Wooded dunes of the Atlantic, Continental and Boreal region**.

### 3.4 Decalcified *Empetrum* dunes

There was a loss of area for **2140 Decalcified *Empetrum* dunes** since the baseline survey. Part of the area was revised due to a difference in interpretation of the habitat, however, there was not enough evidence to make a definite call on the remainder of the habitat mapped during the CMP and this area was therefore retained in the revised CMP area. *Empetrum nigrum* was only found associated with an acidic rocky outcrop during the SDM and was therefore mapped as dry coastal heath.

#### 4 REFERENCES

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**An Bliain**  
*Bliain, Oidhreacht agus Ceol*  
 Department of  
 Arts, Heritage and the Gaeltacht

**Monitoring survey of Annex I  
 sand dune habitats in Ireland  
 2011-2012**

**Crummies Bay,  
 Co. Donegal**  
 - Revised Baseline Habitat Map -

SDM code: 175  
 Date of  
 map production: 09-01-2014

The reported boundaries and/or an indicative and general nature only. Boundaries  
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 agus sonraí eile a bhaineann le tuairiscíocht a dhéanamh ar fáil ón tSúil (014/05/01/14).



