Mullet/Blacksod Bay Complex SAC (site code 470)
Conservation objectives supporting document -coastal habitats

NPWS

Version 1

December 2014

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

Please note that this document should be read in conjunction with the following report: NPWS (2014). Conservation Objectives: Mullet/Blacksod Bay Complex SAC 000470. 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.

Mullet/Blacksod Bay Complex SAC is a large coastal site, located in north-west Mayo and comprises much of the Mullet Peninsula, the sheltered waters of Blacksod Bay and the low-lying sandy coastline from Belmullet to Kinrovar. The character of the site is strongly influenced by the Atlantic Ocean and the exposed location of much of the site results in a terrestrial landscape dominated by blown sand and largely devoid of trees. The underlying bedrock is principally metamorphic schist and gneiss. The site displays an excellent range of coastal and marine habitats.

Blacksod Bay is 16km in length and 8km wide at the mouth. It is a shallow bay, reaching a maximum depth of 19m and with weak tidal streams. The bay has a good range of littoral and sublittoral sediment communities

Machair on the Mullet peninsula has been strip fenced since the 1980s when the Land Commission divided uo the land. Cattle rearing is the main farming activity on the peninsula. The site is notable owing to the presence of three lakes: Termoncarragh, Leam and Cross (Browne, 2007). Leam Lough is a lagoon with tidal influences. Termoncarragh is transitional as it contains flora that are confined to fresh water and brackish water (Roden, 1999). Annagh and Termoncarragh contain the most extensive areas of machair in Ireland and were considered of high conservation value (Bassett, 1983). Annagh is the site of the BirdWatch Ireland Nature Reserve. There is one golf course on the peninsula at Carn, which was founded in 1925.

Mullet/Blacksod Bay Complex SAC (site code: 470) is designated for a range of coastal habitats including, saltmarsh and sand dunes. The following five coastal habitats are included in the qualifying interests for the site (* denotes a priority habitat):

- *Salicornia* and other annuals colonising mud and sand (1310)
- Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2120)
- Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)*
- Atlantic decalcified fixed dune (Calluno-Ulicetea) (2150)*
- Machair (21A0)*

The first habitat is a saltmarsh habitat and the last four are associated with sand dune systems, although all five of these habitats are found in close association with each other. Other Annex I habitats, Annual vegetation of driftlines, Perennial vegetation of stony banks, Embryonic shifting dunes, Dunes with *Salix repens ssp. argentea* and humid dune slacks have also been recorded at this SAC by the Coastal Monitoring

Project (CMP) survey (Ryle *et al*., 2009) and Sand Dunes Monitoring Project (SDM) (Delaney *et al*., 2013). The distribution of saltmarsh habitats is presented in Appendix I and the distribution of sand dune habitats is presented in Appendix II.

The Saltmarsh Monitoring Project (SMP) (McCorry & Ryle, 2009)also recorded the Annex I habitats, Atlantic Salt Meadows and Mediterranean Salt Meadows at all four subsites within the Mullet/Blacksod Bay Complex SAC.

The National Shingle Beach Survey (NSBS) surveyed seven sites on the Mullet peninsula, all of which were rated of low or medium interest. This site is notable for its ephemeral shingle ridges. The ridges are 5m high in places (Portcarn) but can disappear for months at a time. The vegetation on these very dynamic ridge systems is sparse and seems to protrude from the dunes and sandy shores on which the shingle is deposited (Moore & Wilson, 1999).

This backing document sets out the conservation objectives for the five coastal habitats listed above in Mullet/Blacksod Bay Complex 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 **saltmarsh habitats** are based primarily on the results of the Saltmarsh Monitoring Project (SMP) (McCorry & Ryle, 2009) and this document should be read in conjunction with that report.

The SMP surveyed, mapped and assessed a total of four sub-sites within Mullet/Blacksod Bay Complex SAC (McCorry & Ryle, 2009):

1. Doolough
2. Bunnahowen
3. Elly Harbour
4. Saleen Harbour

However, this SAC is only listed for one saltmarsh qualifying interest, i.e. *Salicornia* and other annuals colonising mud and sand (1310). This habitat was only recorded at the Elly Harbour sub-site by the SMP. Both ASM and MSM also occur at this sub-site as well as the other four sub-sites (McCorry & Ryle, 2009). As part of the SMP, detailed individual reports and habitat maps were produced for each sub-site and those for Elly Harbour are included in Appendix III.

The conservation objectives for the saltmarsh habitats in Mullet/Blacksod Bay Complex are primarily based on the findings of the SMP. There may be additional areas of saltmarsh with *Salicornia* mudflats present within Mullet/Blacksod Bay Complex SAC.

The targets set for the **sand dune habitats** are based primarily on the results of the Coastal Monitoring Project (CMP) (Ryle *et al.*, 2009) and the Sand Dunes Monitoring Project (SDM) (Delaney *et al*., 2013). This document should be read in conjunction with those reports. The distribution of sand dune habitats within Mullet/Blacksod Bay Complex SAC is presented in Appendix II.

The CMP was a comprehensive national baseline survey of all known sand dune systems in Ireland. A total of eight sub-sites were surveyed, mapped and assessed within Mullet/Blacksod Bay Complex SAC. The sub-sites are:

1. Srah South
2. Srah North
3. Leam Lough
4. Cross Lough
5. Termoncarragh
6. Dooyork
7. Doo Lough
8. Aghleam

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 (Appendices IV to IX).

The SDM subsequently reviewed and modified the methodology used during the CMP to map and assess the conservation status of dune habitats. A subset of 40 sites (including Doo Lough and Aghleam) 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 Doo Lough and Aghleam are included in a set of Appendices at the end of this document (Appendices X and XI).

The conservation objectives for the sand dune habitats in Mullet/Blacksod Bay Complex 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 eight sub-sites as surveyed by the CMP and SDM represent the total area of sand dunes within Mullet/Blacksod Bay Complex SAC.

2 Conservation Objectives

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

3 Saltmarsh habitats

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

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

One habitat, *Salicornia* and other annuals colonising mud and sand (1310), is listed as a Qualifying Interest for Mullet/Blacksod Bay Complex SAC. Other saltmarsh habitats, including ASM and MSM were also recorded in the sub-sites surveyed by the SMP.

The SMP surveyed, mapped and assessed a total of four sub-sites within Mullet/Blacksod Bay Complex SAC (McCorry & Ryle, 2009). See Appendix I for map:

1. Doolough
2. Bunnahowen
3. Elly Harbour (Appendix III)
4. Saleen Harbour

Within Mullet/Blacksod Bay Complex SAC, the areas of *Salicornia* habitat are limited, and was only recorded at one sub-site: Elly Harbour. Detailed descriptions of this habitat and others found in the Elly Harbour sub-site recorded by McCorry & Ryle (2009) in Mullet/Blacksod Bay Complex can be found in Appendix III.

This sub-site is located on the east side of the peninsula and borders the northern part of Blacksod Bay. The saltmarsh at this sub-site is divided by the main road. Saltmarsh west of the road has developed around the shoreline of Leam Lough, which is a circular bay which drains at low tide to expose extensive sandflats. The development of saltmarsh around Leam Lough is an unusual and notable conservation feature of this sub-site. Turf fucoids are species of local distinctiveness recorded at this site (McCorry & Ryle, 2009).

3.1 Overall Objectives

The overall objective for '*Salicornia* and other annuals colonising mud and sand' in Mullet/Blacksod Bay Complex SAC is to '*maintain the favourable conservation condition'*.

This objective is 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.

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 is no decrease in extent from the baseline which was established by McCorry and Ryle (2009). Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is assessed subject to natural processes, including erosion and succession.

Baseline habitat maps were produced for the saltmarsh in Mullet/Blacksod Bay Complex during the SMP. These maps are included with the site report in Appendix III at the end of this document.

The total areas of '*Salicornia* and other annuals colonising mud and sand' within the SAC and the total area of the habitat within each sub-site as mapped by the SMP are presented in the following table.

The following rules were applied when calculating the areas for the site's conservation objectives:

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

Sub-site	Total area (ha) of *Salicornia* mudflats (excluding mosaics) from SMP	Total area (ha) of *Salicornia* mudflats within SAC boundary (including mosaics)
Doolough	-	
Bunnahowen	-	
Elly Harbour	0.024	0.024
Saleen Harbour	-	
Total	**0.024**	**0.024**

The target for this saltmarsh habitat is that its area should be increasing, subject to natural processes, including erosion and succession.

3.3 Range

3.3.1 Habitat distribution

Saltmarsh is is frequently found in many of the sheltered coastal sites around this SAC. Some of these sites are listed on the saltmarsh inventory compiled by Curtis and Sheehy-Skeffington (1998) and were also surveyed by the SMP (Saleen Harbour, Bunnahowan and Doolough). A fourth site listed on the inventory, Gweesalia, was not surveyed by the SMP (McCorry & Ryle, 2009).

Salicornia habitat was recorded from one sub-site by the SMP, at Elly Harbour. ASM and MSM were also recorded at this sub-site as well as the other three subsites, Doolough, Bunnahowen and Saleen Harbour (McCorry & Ryle, 2009).

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

3.4 Structure and Functions

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

3.4.1 Physical structure: sediment supply

Accretion and erosion are natural elements of saltmarsh systems. Maintaining the sediment supply is vital for the continued development and natural functioning of a saltmarsh system. Interruption to the sediment circulation through physical structures can starve the system and lead to accelerated erosion rates. The presence of this *Salicornia* habitat is related to the accretion of sediment near the entrance to the main drainage channel.

The SMP did not note any signs of loss of *Salicornia* habitat due to land use changes or erosion during the current monitoring period. Only a small area of this habitat is present at the site and there are no indications that this habitat was more extensive in the past in Leam Lough.

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

3.4.2 Physical structure: creeks and pans

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

Within the Elly Harbour sub-site, there are frequent signs of former land use on the saltmarsh with numerous drainage channels and some old peat cutting face-banks in the south-west section. These have modified the former saltmarsh structure. The saltmarsh east of the road also shows signs of modification with old drainage channels, signs of old cultivation, old peat cutting face-banks and attempts at land reclamation. The road was built on an embankment that was probably built across former saltmarsh. These impacts are likely to be still having a residual impact on the structure and development of saltmarsh at this sub-site (McCorry & Ryle, 2009).

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

3.4.3 Physical structure: flooding regime

The regular ebb and flow of the tide brings salinity, but also nutrients, organic matter and sediment, which are central to the development, growth and indeed survival of saltmarshes. Saltmarsh vegetation consists of a limited number of halophytic (salt-tolerant) species that are adapted to regular immersion by the tides.

Species in the lowest part of the saltmarsh require regular inundation, while those higher up on the marsh can only tolerate occasional inundation.

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

3.4.4 Vegetation structure: zonation

Saltmarshes are naturally dynamic coastal systems. As is the case on the majority of Irish saltmarshes, ASM is the dominant saltmarsh habitat at Mullet/Blacksod Bay Complex where it occurs in a mosaic with other saltmarsh habitats, including '*Salicornia* and other annuals colonising mud and sand' and 'Mediterranean salt meadows'. In order to ensure the ecological functioning of all of the saltmarsh habitats it is vital to maintain the zonations and transitions to other habitats, including intertidal, shingle and sand dune habitats.

At the Elly Harbour sub-site there are notable successions between the brackish and wet grassland vegetation communities around Leam Lough, which increases the overall diversity of the site. The main communites present are mid-upper vegetation communities towards the sand barrier and lower communities towards the road. At the southern end there is a large salt pan with the development of a small patch of *Salicornia* flats (McCorry & Ryle, 2009).

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

3.4.5 Vegetation structure: vegetation height

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

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

3.4.6 Vegetation structure: vegetation cover

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

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

3.4.7 Vegetation composition: typical species & sub-communities

Saltmarshes contain several distinct zones that are related to elevation and frequency of flooding. The lowest part along the tidal zone is generally dominated by the most halophytic (salt-tolerant) species including common saltmarsh-grass (*Puccinellia maritima*) and species more usually associated with *Salicornia* muds. The mid-marsh zone is generally characterised by sea thrift (*Armeria maritima*), sea plantain (*Plantago maritima*) and sea aster (*Aster tripolium*). This mid-zone vegetation generally grades into an herbaceous community in the upper marsh, dominated by red fescue (*Festuca rubra*), sea milkwort (*Glaux maritima*) and saltmarsh rush (*Juncus gerardii*).

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

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

Turf fucoids are a species of local distinctiveness that were recorded at the Ellly Harbour sub-sites as well as the other three sub-sites surveyed by the SMP within the SAC. Another species of local distinctiveness, is saltmarsh flat-rush (*Blysmus rufus*) which was recorded in saltmarsh at Doolough and Bunnahowen. This species is mainly confined to saltmarshes in the north-west of Ireland but has a fragmented distribution around the rest of Ireland's coast (McCorry & Ryle, 2009).

3.4.8 Vegetation structure: negative indicator species

The only invasive and non-native species recorded on saltmarshes during the SMP was common cordgrass (*Spartina anglica*). This species was not recorded in Mullet/Blacksod Bay Complex SAC by the SMP (McCorry & Ryle, 2009).

While invasive common cordgrass is generally thought to out-compete most saltmarsh species in the lower marsh zone, it seems to have provided new habitat for colonisation by perennial glasswort (*Sarcocornia perennis*) (McCorry & Ryle, 2009).

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

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. Machair is a specialised form of dune system that is only found on the northwest coasts of Ireland and Scotland. Transitional communities can occur between dune habitats and they may also form mosaics with each other. Dune systems are in a constant state of change and maintaining this natural dynamism is essential to ensure that all of the habitats present at a site achieve favourable conservation condition.

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

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

Eight dune habitats were recorded by Ryle *et al*. (2009) but only the four habitats indicated in bold above are listed as Qualifying Interests for Mullet/Blacksod Bay Complex SAC. These habitats include mobile areas at the front, as well as more stabilised parts of dune systems.

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

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

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

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

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 E.U. 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).

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

The CMP surveyed eight sub-sites within Mullet/Blacksod Bay Complex SAC and the SDM re-visited two of these (Doo Lough and Aghleam). See Appendix II for all mapped sand dune habitats:

1. Srah South (Appendix IV)
2. Srah North (Appendix V)
3. Leam Lough (Appendix VI)
4. Cross Lough (Appendix VII)
5. Termoncarragh Lough (Appendix VIII)
6. Dooyork (Appendix IX)
7. Doo Lough (Appendix X)
8. Aghleam (Appemdix XI)

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

The Doo Lough sub-site is located on the eastern side of Blacksod Bay. The dunes at this sub-site extend over almost 2.5km of coastline. The total mapped area at Doo Lough is almost entirely accounted for by approximately equal areas of fixed dune and machair. Over 50ha of fixed dunes up to 400m wide in places, lie on the seaward side of the dune system. The dunes are generally low, scarcely reaching 10m over beach level at the highest point and contain some substantial blowouts. There are also a number of dune slacks within the fixed dune area. A broad machair plain also exceeding 50ha in extent with a topography of low hummocks and hollows, lies on the eastern side of the fixed dunes. Both wet and dry machair vegetation types are found and the habitats is also notable for transition zones to saltmarsh and fen vegetation types on the landward side. The machair at Doo Lough is mostly unfenced commonage, and a portion of the site (49ha) is owned by the NPWS (Ryle *et al.,* 2009; Delaney *et al*., 2013).

The Srah South sub-site is located on the eastern side of Blacksod Bay. Most of the sand dune area at this site is accounted for by fixed dune and machair. There is also a smaller area of mobile dunes, which form a narrow band along the entire seaward edge of the dunes (Ryle *et al*., 2009).

Machair and fixed dune comprise the greater part of the sand dune habitats at Srah North sub-site, though Embryonic dunes and Shifting dunes along the shoreline with *Ammophila arenaria*, are also present. The sand dune habitas at Srah North mostly consist of low sandhills at the western edge of the mainland, to the landward side of which lies a flat sandy plain now divided into small agricultural fields (Ryle *et. al.,* 2009)

At the Aghleam sub-site, Shifting dunes along the shoreline with *Ammophila arenaria*, Embryonic shifting dunes, Dunes with *Salix repens ssp. argentea* (Salicion arenariae) and Humid dune slacks, occur in association with the qualifying interest habitats of fixed dune, machair and Atlantic decalcified fixed dune (Calluno-Ulicetea) (Ryle *et al*., 2009).

The Leam Lough sub-site extends over almost 4km of coastline, from Barrettsplot West in the north to Urdcarrig in the south. Fixed dunes and machair occupy a significant area of this sub-site, and other Annex I habitats mapped include ‘Embryonic shifting dunes’, ‘Shifting dunes along the shoreline with *Ammophila arenaria*’ and ‘Humid dune slacks’ (Ryle *et al*., 2009).

The Cross Lough sub-site is located south of Belmullet and extends from Belderra Strand to Lurgacloy in the south. Habitats recorded at this site include the qualifying interests, Shifting dunes along the shoreline with *Ammophila arenaria*, Fixed dunes with herbaceous vegetation and Machair. Other Annex I habitats at this site include ‘Embryonic shifting dunes’ and ‘Humid dune slacks’ (Ryle *et al.,* 2009).

The Termoncarragh Lough sub-site is the most northerly of four large sand dune sites on the western side of the Mullet peninsula and extends over more than 5km of coastline. Machair and Fixed dunes occupy a sizable area of this sub-site. Other Annex I habitats recorded by the CMP at Termoncarragh include, ‘Annual

vegetation of driftlines', 'Perennial vegetation of stony banks', 'Embryonic shifting dunes', 'Shifting dunes along the shoreline with *Ammophila arenaria'* and 'Humid dune slacks' (Ryle *et al*., 2009).

The combined data from the CMP for the sub-sites at Srah South, Srah North, Leam Lough, Cross Lough, Termoncarragh Lough and Dooyork, along with the data from the SDM for the sub-sites at Doo Lough and Aghleam is presented in Appendix II.

4.1 Overall objectives

The overall objective for 'Shifting dunes along the shoreline with *Ammophila arenaria*' in Mullet/Blacksod Bay Complex SAC is to 'restore the favourable conservation condition'.

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

The overall objective for 'Atlantic decalcified fixed dunes (Calluno-Ulicetea)' in Mullet/Blacksod Bay Complex SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Machair' in Mullet/Blacksod Bay Complex 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 Slyne Head Peninsula SAC during the Coastal Monitoring Project (CMP) (Ryle *et al*., 2009). The maps are included with the individual site reports for Srah South, Srah North, Leam Lough, Cross Lough, Termoncarragh Lough and Dooyork in the Appendices at the end of this document. The baseline habitat maps for Doo Lough and Aghleam were reviewed and updated during the Sand Dunes Monitoring Project (SDM) (Delaney *et al*., 2013) and these updated maps are included with the individual site reports in the Appendices at the end of this document. The data from the CMP and SDM has been combined to the produce the habitat map presented in Appendix II.

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

2120 Shifting dunes along the shoreline with *Ammophila arenaria*

Sub-site	Data source used	Total area within SAC boundary (ha)
Srah North	CMP	1.630
Srah South	CMP	2.225
Leam Lough	CMP	2.362
Cross Lough	CMP	2.606
Termoncarragh Lough	CMP	2.577
Dooyork	CMP	0.140
Doo Lough	SDM	3.559
Aghleam	SDM	3.853
Total		**18.952**

2130* Fixed coastal dunes with herbaceous vegetation

Sub-site	Data source used	Total area within SAC boundary (ha)
Srah North	CMP	5.986
Srah South	CMP	9.097
Leam Lough	CMP	170.634
Cross Lough	CMP	184.742
Termoncarragh Lough	CMP	224.107
Dooyork	CMP	3.732
Doo Lough	SDM	46.348
Aghleam	SDM	292.425
Total		**937.07**

2150* Atlantic decalcified fixed dune (Calluno-Ulicetea)

Sub-site	Data source used	Total area within SAC boundary (ha)
Srah North	CMP	-
Srah South	CMP	-
Leam Lough	CMP	-
Cross Lough	CMP	-
Termoncarragh Lough	CMP	(6.204**)
Dooyork	CMP	-
Doo Lough	SDM	**-**
Aghleam	SDM	4.084
Total		**4.084**

**** A subsequent site visit by NPWS staff casts doubt on the record of this habitat at Termoncarragh.**

21A0* Machair

Sub-site	Data source used	Total area within SAC boundary (ha)
Srah North	CMP	21.438
Srah South	CMP	15.503
Leam Lough	CMP	45.554
Cross Lough	CMP	60.7207
Termoncarragh Lough	CMP	222.755
Dooyork	CMP	31.55
Doo Lough	SDM	59.523
Aghleam	SDM	138.588
Total		**595.638**

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

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

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

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 Mullet/Blacksod Bay Complex 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 Srah North, coastal protection measures in the form of fencing (including access control fencing and sand-trapping fencing), Marram planting and dune reconstruction using gabions and geotextile fabrics have been put in place along the tombolo linking the mainland to Claggan by the Department of Marine and Natural Resources. Historically there was a far more substantial body of sand hills at this site than currently exists (Ryle *et al.,* 2009).

Sand and shingle extraction is known to have occurred in a number of locations throughout the Mullet sand dune sites. The exact extent of the problem is difficult to quantify as it mostly takes place on a small scale over many locations, and may only be discernible for a limited period after the event. Some small-scale removal of sand was observed by the CMP at Leam Lough (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 and 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.

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

4.4.4 Vegetation structure: bare ground

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

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

At the Doo Lough sub-site, sustainable grazing regimes have led to the creation and maintenance of a wide area of speces-rich short turf, a certain proportion of the fixed dune, however, is overgrazed by cattle (Ryle *et al*., 2009; Delaney *et al*., 2013).

At Srah South the sand dune and machair area is unenclosed throughout and grazed by cattle. Some areas of this site, however, were undergrazed and did not support as diverse an assemblage of species as was observed in the more closely grazed areas (Ryle *et al*., 2009).

At Srah North, cattle are the principal grazers in the fenced machair fields, and overgrazing due to the high stocking densities occur throughout a substantial part of the habitat.

At Aghleam, the impact of grazing has been generally positive throughout the dunes and machair, resulting in high species diversity and preventing rank vegetation and scrub from becoming dominant. Unfortunately, there are some areas that have been overgrazed and affected by associated activities such as erosion and invasion of agricultural weeds due to poaching and dunging by cattle (Ryle *et al.,* 2009; Delaney *et al*., 2013).

Although overgrazing and overstocking are among the major impacts at the Leam Lough sub-site, grazing can also be regarded as positive in some areas where stocking levels are lower, yet sufficiently high to maintain the short turf that tends to support a greater diversity of plant species, than other less well grazed, or rank areas (Ryle *et al.,* 2009).

At Cross Lough, the impact of grazing has been generally positive throughout the dunes and machair resulting in high species diversity and preventing rank vegetation and scrub from becoming dominant, some areas, howerver, have been overgrazed and affected by the associated activities such as poaching and invasion of agricultural weeds due to poaching and dunging by cattle (Ryle *et al*., 2009).

At Termoncarragh Lough, overgrazing and overstocking are among the major problems at the site. Cattle account for much of the overgrazing, although this sub-site is one of the few areas on the peninsula where sheep grazing is also common. Horses and donkeys, as is typical throughout the Peninsula sand dune sites, also form a small component of the total grazing stock (Ryle *et al,.* 2009).

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

4.4.6 Vegetation composition: plant health of dune grasses

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

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

4.4.7 Vegetation composition: typical species & sub-communities

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

The mobile dunes at this site support a typical, species-poor flora which includes, sea bindweed (*Calystegia soldanella*) (Natura 2000) which has a scattered distribution along the north-west coast.

The Atlantic decalcified fixed dune at this site supports characteristic species of the habitat such as, ling heather (*Calluna vulgaris*), bell heather (*Erica cinerea*), and sand sedge (*Carex arenaria*). Also present are harebell (Campanula rotundifolia), Lady's bedstraw (*Galium verum*), heath-grass (*Danthonia decumbens*), sheep fescue (*Festuca ovina*), red fescue (*Festuca rubra*), sheep's-bit (*Jasione montana*), lyme-grass (*Leymus arenarius*), tormentil (*Potentilla erecta*), devil's-bit scabious (*Succisa pratensis*), wild thyme (*Thymus praecox*) and fir clubmoss (*Huperzia selago*). In the more grassy areas, some rarer species occur

including Autumn Lady's tresses (*Spiranthes spiralis*), lesser butterfly orchid (*Planthera bifolia*) and field gentian (*Gentianella campestris*) (Natura 2000)

Rare elements of the site flora include the Annex II liverwort species *Petallophyllum ralfsii* which has been recorded from damp areas of machair within the SAC. The Red Data Book species, narrow-leaved marsh orchid (*Dactylorhiza traunsteineri*) also occurs at the site (Ryle *et al*., 2009).

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

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

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

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

The sub-sites in the Mullet/Blacksod Bay Complex support a characteristic dune flora, details of which can be found in the individual site reports from the CMP (Ryle *et al.,* 2009) and SDM (Delaney *et* al., 2013), which are included in Appendices IV to XI.

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

4.4.8 Vegetation composition: negative indicator species

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

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

At Doo Lough, the negative indicator species, common ragwort (*Senecio jacobaea*), creeping thistle (*Cirsium arvense*) and perennial rye grass (*Lolium perenne*) were recorded. The total combined cover, however didnot exceed 5% (Ryle *et al.*, 2009).

At Srah South, common ragwort (*Senecio jacobaea*) was recorded in both the fixed dune and machair, however, the cover only exceeded 5% in the fixed dune monitoring stops (Ryle *et al*., 2009).

At Srah North, there is an abundance of 'agricultural' grasses such as perennial rye grass (*Lolium perenne*) and in several areas there is dense weed growth in which the most common species include spear thistle (*Cirsium vulgare*) and common ragwort (*Senecio jacobaea*). The proliferation of nitrophilous weed is partly attributable to the supplementary feeding of animals that leads to localised patches of soil enrichment (Ryle *et al*., 2009).

At Leam Lough, negative indicator species component of the machair and fixed dune includes perennial rye grass (*Lolium perenne*) and common ragwort (*Senecio jacobaea*). Also within the fixed dune habitat at this site, common ragwort (*Senecio jacobaea*) and common nettle (*Urtica dioica*). A patch of New Zealand flax (*Phormium tenax*) has also established on the fixed dunes at the Leam Lough sub-site (Ryle *et al*., 2009).

At Cross Lough, the negative indicator species common ragwort (*Senecio jacobaea*), creeping thistle (*Cirsium arvense*) and perennial rye grass (*Lolium perenne*) are common throughout the fixed dunes. Creeping thistle (*Cirsium arvense*) is also common in the mobile dunes at this site. Within the machair, common ragwort (Senecio jacobaea), creeping thistle (*Cirsium arvense*), nettle (*Urtica dioica*) and perennial rye grass (*Lolium perenne*) are all common owing to the intensive agricultural use of the striped fields (Ryle *et al*., 2009).

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

4.4.9 Vegetation composition: scrub/trees

This attribute only applies to the fixed dunes and machair. 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.

Within the Mullet/Blacksod Complex SAC, the levels of grazing are such that they prevent scrub from becoming dominant (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.

5 References

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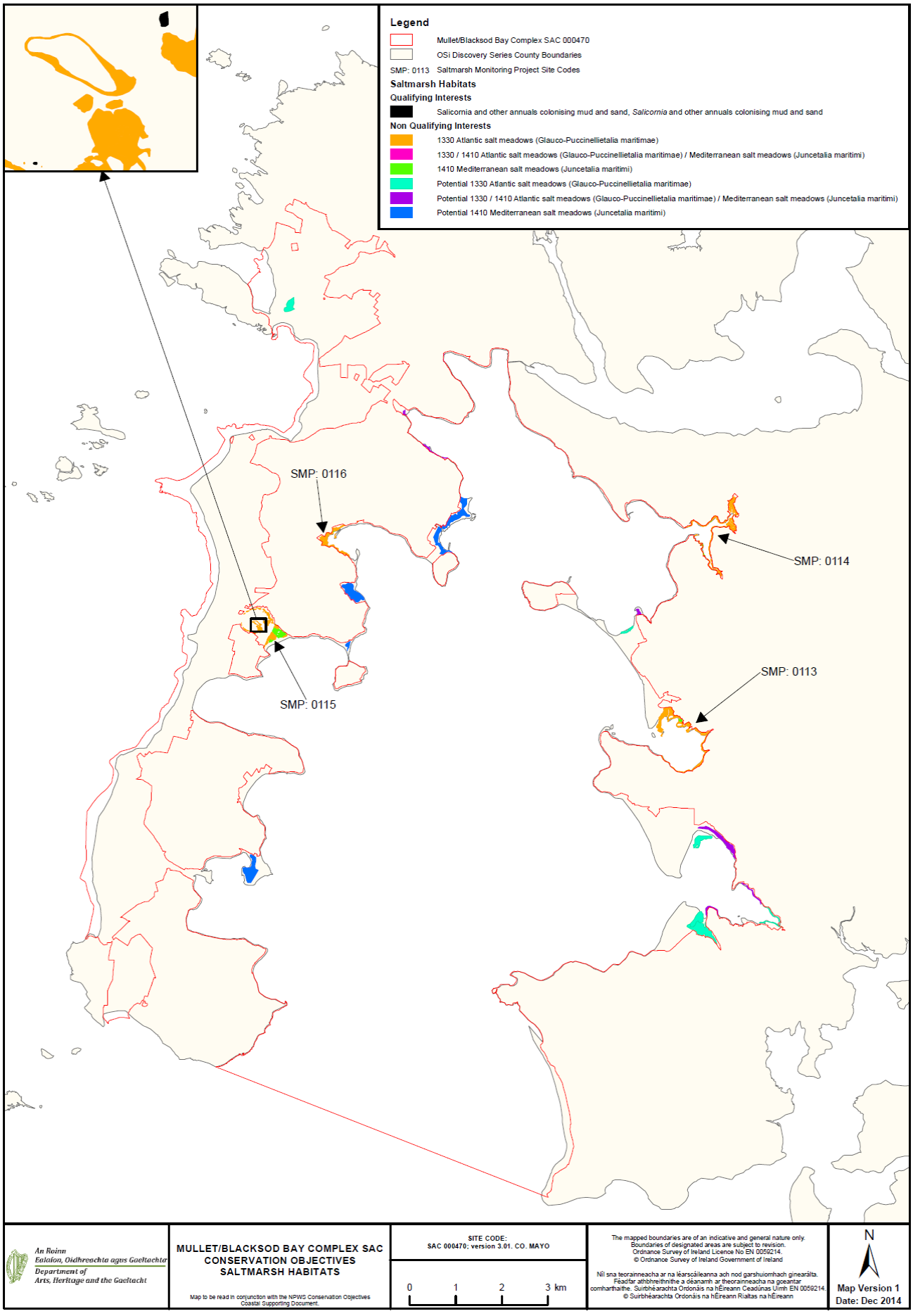
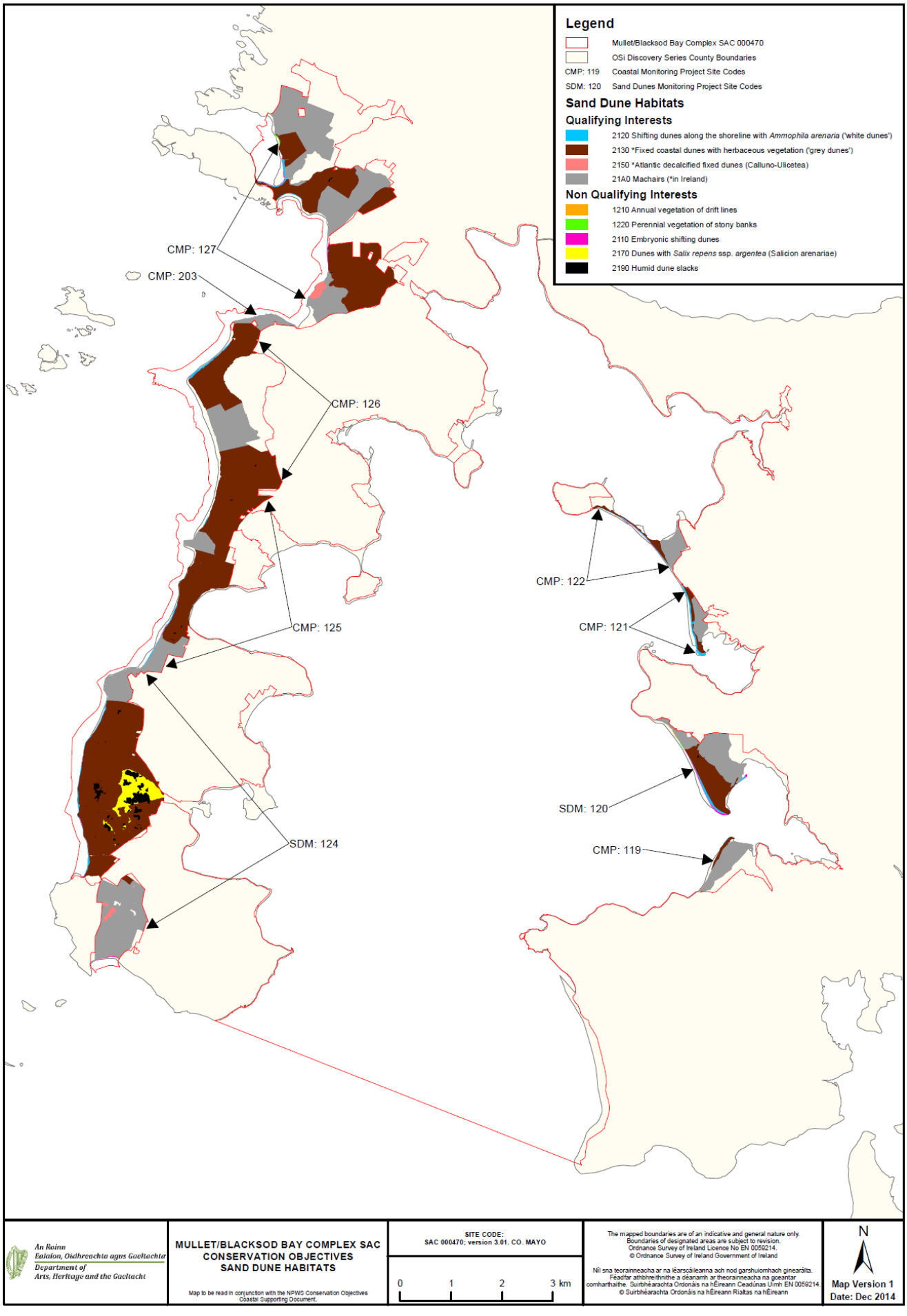
Appendix I – Distribution map of saltmarsh habitats within Mullet/Blacksod Complex SAC



Appendix II – Distribution map of sand dune habitats within Mullet/Blacksod Bay SAC



Appendix III – Elly Harbour report and habitat map from the SMP (McCorry & Ryle, 2009)

1 SITE DETAILS

SMP site name: **Elly Harbour**		SMP site code: **SMP0115**
Date of site visit **25/07/2008**		CMP site code: **N/A**
SM inventory site name: **Elly Harbour**		SM inventory site code: **50**
NPWS Site Name: **Mullet/Blacksod Bay Complex cSAC**		
NPWS designation	cSAC: **000470**	MPSU Plan: **none available**
	pNHA: **000470**	SPA: **004037**
County: **Mayo**		Discovery Map: **22** Grid Ref: **064875, 326875**
Aerial photos (2000 series): **Ma 016**		6 inch Map No: **O 1167-A,B,C,D**
Annex I habitats currently listed as qualifying interests for Mullet/Blacksod Bay Complex cSAC: **H1310 *Salicornia* and other annuals colonizing mud and sand**		
Other SMP sites within this SAC/NHA: **Doolough, Bunnahowan, Saleen Harbour**		
Saltmarsh type: **Bay**		Substrate type: **Sand**

2 SITE DESCRIPTION

Elly Harbour saltmarsh is located on the Belmullet Peninsula in north-west Co. Mayo. The site is located along the east side of the peninsula, 8 km south-west of Belmullet Town. This site borders the northern part of Blacksod Bay. Elly Harbour is a small sheltered bay where the peninsula becomes quite narrow. There is a strong oceanic influence on the Belmullet Peninsula but this site is somewhat sheltered being on the east side. The landscape of this area is low-lying and is dominated by coastal habitats. This part of the peninsula is quite narrow (1.65 km) and the site is situated adjacent to extensive fixed dune habitat with tall sand dunes present. There is some improved grassland and wet grassland also present in the area. This area is sparsely populated with scattered dwellings along the main road (R313) that accesses the southern end of the peninsula and divides the site into two sections.

The saltmarsh is divided into two main sections by the main road. Saltmarsh east of the road is located along the shoreline of a small sheltered half-mooned bay called Elly Harbour. This saltmarsh has developed behind a sand dune/shingle barrier. Saltmarsh west of the road has developed around the shoreline of Leam Lough. This area is not actually a lough but a circular bay that drains at low tide to expose extensive sandflats. The surface of Leam Lough is somewhat higher in elevation (0. 6 m) than the shoreline of the outer bay, some it is only completely inundated by spring tides. The bay is connected to the other section of saltmarsh by one main channel that drains under the road and also drains the eastern section before entering Elly Harbour. The development of saltmarsh around Leam Lough is an unusual and notable conservation feature of this site.

The majority of the site is located within the Mullet/Blacksod Bay Complex cSAC and pNHA. This is a large coastal site that includes the northern part of Blacksod Bay, coastal habitats on both sides of the peninsula and coastal habitats along the mainland. Three Annex I saltmarsh habitats are present at this site, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). *Salicornia* flats (1310) are the only Annex I saltmarsh habitat listed as a qualifying interest for this cSAC. Saltmarsh is frequently found in many of the sheltered coastal sites around this cSAC. Several of these sites are listed on the SM inventory (Curtis and Sheehy-Skeffington 1998) and were also surveyed during the Saltmarsh

Monitoring Project (Saleen Harbour on the peninsula to the north of this site, Bunnahowan and Doolough along the mainland). A fourth site listed on the SM inventory, Gweesalia, was not surveyed during the SMP. All of saltmarsh habitat mapped at this site is located within the SAC boundary.

Turf fucoids are the only species of local distinctiveness recorded at this site and these are typical of saltmarsh found along the western coast of Ireland. One species of note that has been recorded in this area is Common Cordgrass (*Spartina anglica*) (Preston *et al.* 2002). There is one isolated record in north-west Mayo in a 10 km square positioned over the southern end of the peninsula. However, this species was not recorded on the Bellmullet Peninsula or in north-west Mayo during the SMP.

The site was easily accessed via an adjacent main road that is positioned close to the shoreline. The area east of the road and north of the drainage channel could not be accessed due to livestock on this part of the site.

3 SALTMARSH HABITATS

General description

This site is divided into two main sections by the main road. The largest area of saltmarsh is located to the east of the road. This saltmarsh has developed on peat and is sheltered by a sand/shingle barrier. The substrate is sandier towards the southern end and this influences the vegetation types that have developed in this area. This area contains the MSM habitat, which dominates the section north of the main drainage channel. The southern section is flooded via tidal inundation from the new drains along the road, so the saltmarsh structure has been modified.

This area has been significantly modified by old land use, cultivation and drainage and there are still signs of peat cutting with old face-banks present. Some of the saltmarsh is likely to have been created by peat cutting, which has lowered the ground level to a level that could be inundated by the tide. Some of the remaining peat-banks are at a higher level and contain boggy-transitional grassland with Glaucous Sedge (*Carex flacca*) and Carnation Sedge (*Carex panicea*) prominent and other upper saltmarsh species such as Creeping Bent (*Agrostis stolonifera*), Buck's-horn Plantain (*Plantago coronopus*) and Autumn Hawkbit (*Leontodon autumnalis*) also present. This type of acid grassland is also found on some naturally occurring mounds within this area. Some of these mounds are vegetated with transitional MSM vegetation with Sea Rush (*Juncus maritimus*) prominent but other species such as Purple Moor-grass (*Molinia caerulea*) and Glaucous Sedge present.

The saltmarsh east of the road has a band of Common Reeds (*Phragmites australis*) along the northern boundary. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. A grassy roadside embankment marks the western boundary of this saltmarsh. There is a natural succession of vegetation from saltmarsh to fixed dune type coastal grassland along the sand barrier that protects this site.

There is a brackish gradient across Leam Lough from the western to the eastern end. Most of the lough contains bare sandflats but there are small patches of Eel-grass (*Zostera* sp.) present in shallow pools. The eastern end has a greater saline influence and greater development of ASM vegetation. There is very little ASM vegetation along the western side of the lough, which is flooded by fewer tides. The western shoreline of the lough is dominated by brackish vegetation (mainly classified as CM2 or non-Annex I vegetation types) with stands of Sea Club-rush (*Bolboschoenus maritimus*) and Common Reed on the shoreline. There are complicated mosaics of brackish vegetation dominated by Sea Club-rush, transitional brackish-wet grassland vegetation and some typical ASM vegetation along this shoreline. Transitional vegetation also develops on low ridges adjacent to the ASM in places with Sea Mayweed (*Tripleurospermum maritimum*), Sow-thistle (Sonchus sp.) and Twitch (*Elytrigia repens*) all appearing. The more typical ASM vegetation sometimes is present behind a stand of Sea Club-rush that is spreading on the shoreline. There is notable development of

natural successions between the brackish and wet grassland vegetation communities around the lough, which increases the overall diversity of the site. There is a small 'island' or mound present in the eastern side of the lough. This is dominated by rank coastal grassland and has a fringe of ASM around its shoreline.

The eastern side of the lough shoreline has been modified by old land use and the development of the road, although the rest of the shoreline is still fairly intact and unmodified. The south-east sections have been significantly modified by old drainage channels and old peat-cutting. There has lead to the creation of small mosaic areas with saltmarsh and terrestrial vegetation intermixed. ASM, transitional and brackish vegetation dominated by stands of Sea Club-Rush are inter-mixed. The saltmarsh and brackish vegetation is associated with the drainage channels and adjacent low-lying areas. The appearance of vegetation dominated by Soft Rush (*Juncus effusus*) and also containing Yellow Flag (*Iris pseudacorus*), Glaucous Sedge, marks the transition to more typical wet grassland (GS4). There is also a small area near the opening of the main drainage channel where there is a mosaic of ASM and small mounds containing dry grassland with species such as Tufted Vetch (Vicia cracca), Birdsfoot (*Lotus corniculatus*), Sow-thistle (*Sonchus* sp.) Yorkshire Fog (*Holcus lanatus*) and False Oat-grass (*Arrhenatherum elatius*) present. This topography may have been created by dumping of spoil in the past.

Table 3.1. Area of saltmarsh habitats mapped at Elly Harbour.

EU Code	Habitat	Area (ha)
1310	*Salicornia* and other annuals colonizing mud and sand (1310)	0.024
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	7.205
1410	Mediterranean salt meadows (Juncetalia maritimi)	4.158
	Total	**11.387**

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

3.1 *Salicornia* and other annuals colonizing mud and sand (H1310)

A small patch of this habitat has developed on the sand flats in Leam Lough. This pioneer saltmarsh has developed on bare sand on a small raised mound. The habitat is dominated by Glasswort (*Salicornia* sp.) with few other saltmarsh species present apart from a small amount of Common Saltmarsh-grass (*Puccinellia martima*). There are several other isolated patches on Leam Lough. This vegetation type also appears as a very narrow band (unmapped) in places associated with the lower seaward boundary of the pioneer ASM.

A very small patch of *Salicornia* flats also developed in a large salt pan east of the main road.

Atlantic salt meadows (H1330)

Several different communities are present within the ASM at this site. The ASM is best developed at the southern end of the eastern section. The main communities present are mid-upper vegetation communities and the zonation of the communities is moderately well-developed with higher communities towards the sand barrier and lower communities towards the road. There is a low sward dominated by Sea Plantain (*Plantago maritima*), Saltmarsh Rush (*Juncus gerardii*) and Red Fescue (*Festuca rubra*). Other species present towards the southern end include Long-bracted Sedge (*Carex extensa*), Sea Milkwort (*Glaux maritima*), White Clover (*Trifolium repens*) and Sea Arrowgrass (*Triglochin maritimum*). This area also contains a large salt pan with development of a small patch of *Salicornia* flats. The ASM also contains some small patches of Sea Rush, (too small to be mapped as MSM). There is some development of low marsh vegetation along the drain adjacent to the road, dominated by Common Saltmarsh-grass and also containing Glasswort and Annual Sea-blite (*Suaeda maritima*). Typical grassy upper marsh vegetation develops on the sand barrier along the upper SM boundary and along the track in this area. There are transitional elements within the

upper ASM such as Red Clover (*Trifolium pratense*). The sward heights are low due to light levels of grazing. The saltmarsh topography is well-developed in this area.

Less typical upper saltmarsh ASM develops in places along the western shoreline of Leam lough. The ASM development is quite narrow and brackish vegetation types dominate in this area. There is no real zonation within the ASM into different communities although there is zonation to other vegetation types. The ASM contains Red Fescue, Creeping Bent, Sea Aster (*Aster tripolium*), Saltmarsh Rush, Common Scurvy-grass, Sea Arrowgrass, Common Saltmarsh-grass, Sea Milkwort and Sea Plantain. This ASM has developed on a slight ridge along the shoreline in places, but there area signs of some spread of vegetation onto the sandflats in places. The sward height is generally tall as this saltmarsh is not grazed. There are other more typical patches of Red Fescue dominated upper ASM present in places with White Clover, Sea Plantain and Distant Sedge (*Carex distans*). There are transitional elements within this sward with Curled Dock (*Rumex crispus*) and Sow-thistle present.

There are also signs of brackish influence on the ASM at other locations along the western and northern shorelines with the presence of species like Common Reed and Sea Club-rush spreading into the ASM and Spike-rush sp present. Spike Rush (*Eleocharis* sp.) dominates some ASM vegetation along the northern side of Leam Lough. Saltmarsh Flat-rush (*Blysmus rufus*) is also present in places but is rare.

Pioneer ASM is developing in the north-eastern part of the lough near the main drainage channel. This consists of small low mounds of sand being vegetated by Common Saltmarsh-grass. Other species present include Sea Pink, Sea Plantain, Sea Milkwort, Annual Sea-blite, Sea Aster and Glasswort. This vegetation type is quite open with bare sand dominating cover. This community is associated with a large area of mid marsh vegetation. The mid-marsh vegetation is more established with a fuller fairly flat sward, although it is still immature and the saltmarsh topography is poorly developed, indicating it has only recently formed.

A more typical mid-upper vegetation community develops at the eastern side of the lough in a small mosaic area with low mounds. The ASM is found in the hollows and channels and is dominated by Red Fescue, Sea Plantain and Saltmarsh Rush. Each of these species may dominate due to the complex zonation within this mosaic area. Some of the ASM along the southern side of the lough is poached and damaged.

Mediterranean salt meadows (H1410)

The MSM is found on the saltmarsh east of the road. Several vegetation communities are present. There is some patches of Sea Rush found in association with mid marsh vegetation dominated by Sea Plantain and also containing Greater Sea-spurrey (*Spergularia media*), Common Saltmarsh-grass, Sea Aster and Sea Arrowgrass. Other more typical MSM vegetation has developed at a higher level adjacent to the sand barrier. This vegetation type is dominated by Sea Rush and contains frequent Red Fescue and smaller amounts of Saltmarsh Rush and Distant Sedge. MSM at the southern end of this area has moderately well-developed saltmarsh topography. There are some pans and small creeks present within the MSM. The MSM in the other sections has been disturbed significantly by land-use activities in the past, such as cultivation and peat-cutting.

The saltmarsh found to the north of the main drainage channel contains some mosaic areas of ASM and MSM (not mapped) although this area is dominated by MSM. The topography of this area is quite variable and there are several mounds that contain transitional type MSM. This vegetation type can be seen towards the northern side of the saltmarsh where Common Reed is spreading into the MSM in places.

4 IMPACTS AND ACTIVITIES

The main impact affecting this site is grazing (Table 4.1). This site is located in a relatively isolated location so there are few other impacts or activities affecting this site related to land-use, development or amenity use.

Table 4.1. Intensity of various activities on saltmarsh habitats at Elly Harbour.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1310	910	C	+1	0.024	Inside
1330	140	B	0	3.000	Inside
1330	143	C	-1	0.100	Inside
1330	501	B	-2	0.005	Inside
1330	900	C	0	0.005	Inside
1330	910	C	+1	0.300	Inside
1330	990	C	0	0.050	Inside
1410	140	C	0	3.158	Inside
1410	143	B	-1	1.000	Inside
1410	990	C	0	0.050	Inside

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

A large section of saltmarsh east of the road is grazed by cattle (140). There is some localised damage from poaching within the area north of the main channel (143). A smaller area at the southern end is not grazed. Some of the saltmarsh around the Leam Lough shoreline is grazed but most is not. Fences generally fence off the saltmarsh and the sandflats from the adjacent wet grassland or improved grassland around the bay. However, there are several sections where the saltmarsh habitat extends into the grazed enclosures.

There is a small track extending onto the saltmarsh on the east side of the road. There is access to the shoreline from this track and there has been some infilling (501).

A comparison of the OSI 2nd edition 6 inch map to the current OSI 2005 series aerial photos shows that the shoreline of Leam Lough is quite dynamic and there have been some changes during this period. There is some accretion (910) and growth of saltmarsh in the north-eastern end of Leam Lough near to the start of the drainage channel. There are accretion ramps in this area leading to the development of pioneer ASM and *Salicornia* flats. A comparison of the 1995, 2000 and 2005 OSI aerial photos series and the GPS survey points shows that there has been some growth of saltmarsh at this location during this period. There have been smaller changes along the other parts of the shoreline with some expansion of Sea Club-rush dominated stands into the sand flats. Erosion is assessed as having a neutral impact on a small portion of the saltmarsh.

A comparison of the OSI 2nd edition 6 inch map to the current OSI 2005 series aerial photos also shows that there have been some changes to the saltmarsh east of the road. There has been some natural transition (990) of saltmarsh habitats to sand dune and shingle bank habitats along the Elly Harbour shoreline where sand has blown over the barrier and encroached onto the saltmarsh. These changes are visible from a comparison of the 2000 and 2005 aerial photos. The saltmarsh is protected from erosion by this sand/shingle barrier. There is some minor erosion along the main channel draining Leam Lough due to scouring (900).

There are frequent old signs of land use on the saltmarsh with numerous drainage channels (810) and some old peat cutting face-banks (311) in the southwest section. These have modified the former saltmarsh structure. The main Leam lough drainage channel has also been modified to improve drainage. The saltmarsh east of the road also shows signs of modification with old drainage channels, signs of old

cultivation (100) old peat cutting face-banks (311) and attempts at land reclamation (802). The road crossing the site was built on an embankment that was probably built across former saltmarsh. The impacts of these activities are not assessed as they occurred prior to the current monitoring period. However, they are still having a residual impact on the structure and development of the saltmarsh habitat.

The main Impacts and activities adjacent to the site are related to agriculture. Improved grassland is grazed (140) and some is also fertilised (120) and cut (102) for cattle fodder. Other impacts and activities include dispersed habitation (403) and roads (502). The agricultural activities have little or no measurable impact on the saltmarsh habitats.

5 CONSERVATION STATUS

Overall Conservation Status

The conservation status of a site is assessed on the condition of the site and on baseline information. The main source of baseline information for this site is the 1995, 2000 and 2005, OSI aerial photo series. The baseline information from the NHA survey is generally limited to some descriptions of saltmarsh habitat and does not record the specific condition of the saltmarsh during the survey at this site. There are no specific notes in the NHA survey for this site.

Elly Harbour is a medium sized saltmarsh with some features of conservation inertest. The overall conservation status of this site is *unfavourable-inadequate* (Table 4.1). The saltmarsh topography has been significantly modified in the past by land use practices such as cultivation and peat-cutting and these impacts are having a residual impact on the structure and zonation of the saltmarsh vegetation. Most of the site is in good condition but there is some localised damage caused by cattle grazing. There are no other impacts or activities significantly affecting this site. The presence of saltmarsh, brackish and wet grassland vegetation communities around the Leam Lough shoreline is a feature of notable conservation interest due to the added diversity of these habitats and the complicated zonation and transitions between these vegetation types.

This site is located within the Mullet/Blacksod Bay Complex cSAC and pNHA. A NPWS Conservation management plan is not available for this cSAC.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Elly Harbour.

Habitat	**EU Conservation Status Assessment**			
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**	**Overall EU conservation status assessment**
Salicornia flats (1310)	Extent Structure and functions Future prospects			Favourable
Atlantic salt meadows (1330)	Extent	Structure and functions, Future prospects		Unfavourable - Inadequate
Mediterranean salt meadows (1410)	Extent	Structure and functions, Future prospects		Unfavourable - Inadequate

5.1 *Salicornia* and other annuals colonizing mud and sand (H1310)

Extent

The extent of this habitat is assessed as *favourable*. There are no indications of any loss of habitat due to land-use changes or erosion within the current monitoring period. Only a small area of this habitat is present at the site. There are no indications that this habitat was more extensive in the past in Leam Lough.

It should be noted that this is the only surveyed site in Blacksod Bay where this habitat was recorded. *Salicornia* flats was the only saltmarsh habitat listed as a qualifying interest for this cSAC but a very low extent was recorded at the 4 sites within the cSAC that were surveyed as part of the SMP.

Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. One monitoring stop was carried out in this habitat and all the attributes required for favourable conservation status passed. The presence of this habitat is related to the accretion of sediment near the entrance to the main drainage channel.

Future prospects

The future prospects of this habitat are assessed as *favourable*. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. There are no significantly damaging activities affecting this habitat at this site. The extent of this habitat is likely to be dynamic and related to sedimentation within Leam Lough. There may be losses and gains of habitat related to changes in sedimentation patterns in the future.

Atlantic salt meadows (H1330)

Extent

The extent of this habitat is assessed as *favourable*. There are no indications of any loss of habitat due to land-use changes or erosion within the current monitoring period. There actually has been some minor growth of saltmarsh habitat at this site due to accretion at the eastern end of Leam Lough.

Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Eight monitoring stops were carried out in this habitat and one stop failed. The majority of the ASM is in good condition and the sward cover is generally intact. However, a minor area of the saltmarsh habitat located along the southern side of Leam Lough was damaged by overgrazing and poaching damage. Negative indicators such as high bare mud cover and a disturbed sward cover are present within this small area. Some of the ASM that is grazed on the east side of the road has contains some localised poaching damage. The structure of the ASM to the east of the road has been significantly modified in the past due to last-use activities and this is still having a residual impact on the structure of the habitat.

The species diversity in this habitat is typical of ASM and several different vegetation communities were recorded at this site including some notable brackish communities around the shoreline of Leam Lough. The brackish gradient that is present in the vegetation around this lough is a notable feature of interest. The saltmarsh topography is well-developed in parts of the ASM at this site. The zonation within this habitat is also well-developed. Overall, the sward structure is also quite heterogeneous due to variable grazing levels around the site and a substantial area of ASM is not grazed. There are some natural successional communities to terrestrial vegetation and other coastal habitats such as fixed dune vegetation on the sand barrier present. There is some recent growth of saltmarsh in Leam Lough and pioneer ASM vegetation is present. This is a positive indicator.

Future prospects

The future prospects of this habitat are assessed as *unfavourable-inadequate*. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. Overgrazing is the man activity affecting the ASM at this site and this activity only affects a small area of habitat. There is no NPWS conservation management plan available for this site. There is currently an accretional trend in part of the site (Leam Lough) although any growth of saltmarsh in this area may be a short-term gain and may be lost if there are changes in sedimentation patterns.

Mediterranean salt meadows (H1410)

Extent

The extent of this habitat is assessed as *favourable*. There are no indications of any loss of habitat due to land-use changes or erosion within the current monitoring period.

Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. One monitoring stop was carried out in this habitat and it passed. All of the attributes required for the structure and functions of this habitat reached their targets. However, there are some signs of localised poaching damage in the area north of the main drainage channel (no monitoring stops in this area). The MSM is not affected to the same extent by overgrazing as the ASM. The species assemblage of the MSM is typical of this vegetation type. There is some internal zonation within this habitat due to the irregular topography of the saltmarsh east of the main road with mounds, shallow hollows and salt pans present. There is also some development of transitional MSM vegetation with the appearance of species such as Purple Moor-grass, Common Reed and Carnation Sedge in the upper MSM on some of the higher mounds.

Future prospects

The future prospects of this habitat are assessed as *unfavourable-inadequate*. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. Localised overgrazing by cattle is the man activity affecting this site but it does not significantly affect the MSM.

6 MANAGEMENT RECOMMENDATIONS

There are no specific management recommendations for this site.

7 REFERENCES

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

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8 APPENDIX I

Table 8.1. Areas of SMP habitats mapped using GIS.

SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 *Salicornia* flats	0.024	0.024				
2	Spartina swards						
3	1330 Atlantic salt meadow	7.078		7.288			
4	1410 Mediterranean salt meadow	4.136			4.136		
5	ASM/MSM mosaic (50/50)	0.044		0.022	0.022		
6	ASM/*Spartina* mosaic						
7	1330/other SM (CM2) mosaic						
8	1330/coastal grsld mosaic	0.210		0.105			
9	Other (non saltmarsh)	18.603					
10	*Spartina* clump/mudflat mosaic (50/50)						
11	Isolated *Spartina* clumps on mud (5%)						
12	pioneer 1330/1310/*Spartina* mosaic						
13	1410/other SM (CM2) mosaic						
14	*Spartina* sward dominated, with some ASM						
15	1310/*Spartina* mosaic						
16	ASM dominated with some Spartina						
17	1330/sand dune mosaic						
18	Other SM (CM2)	1.563					
19	1330/rocky shore mosaic						
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	**31.658**	**0.024**	**7.205**	**4.158**		

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

SITE DETAILS

CMP06 site name: **Srah South** CMP06 site code: **121** CMP Map No.: **119**

County: **Mayo** Discovery map: **22** Grid Reference: **F 733 250**

6 inch Map No.: **Ma 17**

Aerial photographs (2000 series): **O1169-C; O1235-A**

NPWS Site Name: **Mullet / Blacksod Complex**

NPWS designation: pNHA: **470** cSAC: **470** SPA: **4037**

Ranger Area: **Mayo**

MPSU Plan**: Draft 2: Consultation**

Report Author: **Kieran Connolly**

SITE DESCRIPTION

Srah South, on the eastern side of Blacksod Bay in North Mayo, is about 4km southwest of Bunahowen village and is contiguous with Srah North (site 122 in the present report). Both are within the Mullet/Blacksod Complex cSAC (cSAC 470). Also included in the cSAC are Dooyork and Doolough (sites 119 and 120 respectively), which lie to the south of Srah, and four large sites on the west side of the Mullet Peninsula - Aghleam (site 124), Leam Lough (site 125), Cross Lough (site 126) and Termoncarragh Lough (site 127). For the purposes of this report, Srah North and South are divided by an arbitrarily chosen boundary, which is included as a theme ('Site division') on the accompanying digital map.

Much of the total cSAC area – an estimated 60% in the NATURA 2000 standard data form – is accounted for by marine areas and sea inlets, while the machair and sand dune component (including sand beaches) was estimated as 16% of the total area. The other habitat class that represents a significant proportion of the total area is that which encompasses tidal rivers, estuaries, mud flats, sand flats and lagoons.

Srah south extends over approximately 1.6 km of west-facing coastline in Blacksod Bay, and comprises a total sand dune area of 28.452ha (Table 120A). Most of this is accounted for by fixed

dune and machair – both priority Annex I habitats, which together comprise over 26ha of the total area of 28.452ha. A smaller area of mobile dunes, which form a narrow band along the entire seaward edge of the dunes, makes up the remaining sand dune habitat (Table 120A). The sand hills and machair are unenclosed and grazed by cattle.

The landward (eastern) boundary of sand dune and machair habitats is also the easternmost boundary of the cSAC along much of the site, as the small fields to the east are mostly quite intensively farmed and of little conservation interest. The cSAC boundary also corresponds to the boundary of an unenclosed area that bears the legends 'Sand Hills' and 'Blowing Sand' on the site 6" map. In the southern end of the site, fixed dune and machair are bordered by saltmarsh vegetation, although a certain area of habitat may be described as transitional between sand dune and saltmarsh vegetation.

Srah South resembles both Doolough and Dooyork, which lie to the south, in consisting of a small, flat, unenclosed machair plain, with both wet and dry vegetation communities, on the landward side of a narrow strip of sand hills. The machair at Srah South has (again in common with Dooyork and Doolough) probably gained in relative importance and interest in recent times, due to the general deterioration in machair habitats on the Mullet peninsula that has resulted from the division of open commonage into small fenced strips.

The rare liverwort, *Petalophyllum ralfsii* (Petalwort) is known from the nearby Dooyork and Doolough, but not from Srah, although it was not intensively searched for during the present study.

Table 121A Areas of EU Annex I habitats mapped at Srah South

EU Code	EU Habitat	Area (ha)
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	2.295
H2130	Fixed coastal dunes with herbaceous vegetation	10.085
H21A0	Machair	16.072
	Total Sand dune	**28.452**

Access roads and tracks into the site are easily identifiable on local maps and aerial photographs, although the presence of livestock, and the necessity to pass through farm gates to gain access to the dunes may deter some potential visitors.

Machair (H21A0)

Machair at Srah South consists of a flat plain on the landward side of a narrow band of sand hills and forms over 16ha of the total sand dune area at Srah South. The machair is largely intact and relatively undamaged, contains both wet and dry areas with a corresponding variety in vegetation composition and forms an interesting transition to saltmarsh habitat in the southern part of the site.

Machair at Srah south was not included by Bassett (1983), in her survey of Irish machair sites, nor was it included in the more recent Biomar machair survey (Crawford *et al*., 1996). A small area of machair in Srah North, which has subsequently been all but destroyed by erosion, was the only example of the habitat identified by Bassett at Srah. However, Srah South is recognised as a machair site in the NPWS inventory of sand dunes sites.

The omission of Srah South machair from previous surveys of the habitat may be due to fact that several of the larger sites within the cSAC, particularly those on the Mullet Peninsula, formerly held some of the best and most extensive examples of the habitat in the country and were considered to be of greater interest and importance. It is only in recent years that Srah South, and other intact sites like Dooyork and Doolough, have increased in relative importance, as the Mullet sites have been progressively damaged by an intensification of livestock rearing practices.

The more commonly noted species from the monitoring stop list of dry machair species included *Achillea millefolium* (Yarrow), *Bellis perennis* (Daisy), *Cerastium fontanum* (Common mouse-ear), *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Common Bird's-foot-trefoil), *Plantago lanceolata* (Ribwort plantain) and *Trifolium repens* (White clover). Those from the wet machair list included *Carex arenaria* (Sand sedge), *C. flacca* (Glaucous sedge), *C. nigra* (Common sedge), *Hydrocotyle vulgaris* (Marsh pennywort) and *Prunella vulgaris* (Selfheal). Other species noted in wet machair included *Cardamine pratensis* (Cuckooflower), *Lychnis flos-cuculi* (Ragged-robin) and *Parnassia palustris* (Grass-of-parnassus).

The more commonly seen moss species included *Calliergonella cuspidata*, *Homalothecium lutescens* and *Rhytidiadelphus squarrosus*.

Fixed Dunes (H2130)

Fixed dunes at the site consist of a narrow strip of low sand hills, mostly between 50 to 60m wide, except in the northernmost part of the site, where they extend across the full width of the site, to a

maximum width of about 130m. On the landward side of the narrow fixed dune area, lies the machair plain that comprises most of the remaining sand dune area.

The fixed dune sward is grazed quite tightly throughout much of the site and species diversity was reasonably high over much of the area. Among the more commonly occurring typical species were *Carex arenaria* (Sand sedge), *Cerastium fontanum* (Common mouse-ear), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Hypochaeris radicata* (Cat's ear), *Lotus corniculatus* (Common Bird's-foot-trefoil), *Luzula campestris* (Field wood-rush), *Plantago lanceolata* (Ribwort plantain) and *Trifolium repens* (White clover).

In some less intensively grazed areas, *Ammophila arenaria* (Marram) forms a significant element of the otherwise *Festuca*-dominated vegetation.

There are significant breaches along the seaward edge of the dunes and bare areas are clearly visible on the site aerial photographs. Some of this may be due to natural erosion and the apparent redistribution of sediment towards the south tip of the site, although the presence of ring feeders indicates that livestock rearing practices are contributing to damage in the sand hills.

Mobile Dunes (H2120)

Mobile dunes at the site – characterised by the dominance of *Ammophila arenaria* (Marram) - consist of a narrow band along the entire seaward edge of the dunes and cover a total area of 2.295ha (Table 121A). The habitat is narrow along much of its length - mostly not exceeding 10m in width - although at the southern tip, it exceeds 40m in places. This may be attributable to the apparent natural movement of sediment towards the southern end of the site.

IMPACTS

Activities observed or known to be impacting on the sand dune habitats at Srah South are shown in Table 121B.

Table 121B Intensity and impact of various activities on sand dune habitats at Srah South

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H2120	140	C	-1	0.5	Inside
H21A0	140	A	+2	16	Inside
H2130	140	A	+2	8	Inside
H21A0	149	C	-1	3	Inside
H2130	171	A	-1	1.5	Inside
H21A0	423	B	-1	0.1	Inside
H21A0	607	C	-1	0.25	Inside
H21A0	623	A	-1	1.5	Inside
H2130	623	A	-1	1.5	Inside
H2120	900	B	0	unknown	Inside
H2130	900	B	0	unknown	Inside

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

The sand dune and machair area is unenclosed throughout and grazing cattle are free to roam the entire area. On the survey date there were in excess of 30 animals at the site, comprised of suckler cows and calves and a number of heifers. The beneficial affects of grazing (code 140) in maintaining a short, species-rich sward is reflected in its description as a strongly managed positive influence in both machair and fixed dunes (Table 121B). Somewhat unusually, there was evidence of grazing of *Ammophila arenaria* (Marram) in the mobile dunes. In this instance, the impact was considered as having a negative affect, as grazing and trampling by animals may destabilise foredune habitats. Although the sward height throughout most of the site would indicate that overgrazing has not been an issue in recent times, there was some poaching of the wetter ground.

Although the entire machair area was unenclosed and freely accessible to grazing livestock, grazing levels were not consistent throughout the site. Some areas, particularly near the landward machair boundary close to the main access track, were slightly undergrazed (code 149) and did not support as diverse an assemblage of species as was generally observed in the more closely grazed areas. The impact was considered to be of only low (C) intensity as the areas in question were by no means severely undergrazed.

The main vehicle access track into the site runs across the machair and dunes to the seaward dune edge. A particularly damaged area on, and beside, the track where people accessing the beach park their vehicles is marked as an information point on the site digital map. Other vehicle tracks diverge from the main track and run towards both the north and south parts of the site. The damage caused

by vehicles is evaluated under code 623 (*Motorised vehicles*). Apart from the damage caused by cars, recreational impacts were apparently very slight and are probably concentrated on the beach, rather than in the sand dune habitats.

A small area of dumped rubble (code 423) - probably associated with a building development - was noted at the landward edge of the machair commonage. The location is included as a 'miscellaneous' information point on the site digital map.

A number of livestock supplementary feeding stations (code 171) were observed in the fixed dunes. The typical damage associated with ring feeders, such as localised enrichment of soil, proliferation of nitrophilous weed species, and the poaching and erosion of vegetation cover were observed. The total area of damage was estimated as 1.5ha and, as is typical of this activity/impact, it was considered to be of high intensity.

An area of approximately 50m x 50m in the machair was staked and marked as a small football pitch (code 607), although damage, in the form of erosion of vegetation cover, was confined to small areas around the goalposts.

Erosion noted along the seaward edge of the dunes may be largely attributable to natural causes (code 900), although the damage may have been exacerbated to some extent by livestock movements, particularly as the foredune zone is not fenced off from the dune grassland.

CONSERVATION STATUS

The conservation status assessment of habitats is based on a combination of extent (area), structure and functions and future prospects assessments (Table 121C). Structure and functions at Srah South were assessed according to the percentage pass/fail rate of monitoring stops carried out in each of the habitats (Table 121D).

Machair (H21A0)

Srah south was not included in the Biomar machair survey of 1996 (Crawford *et al.*), nor were there any other reliable sources of information with which the current extent and condition of machair at the site could be compared. As there were no indications of a recent loss of area in the habitat, extent is rated as *favourable*.

All 4 monitoring stops used in the assessment of habitat structure and functions passed the overall criteria, resulting in a *favourable* assessment. Some of the stops had a negative indicator species element - in each case represented by *Senecio jacobaea* (Common ragwort) - although in none of the stops did the total cover exceed the 5% limit, beyond which the attribute would be deemed to fail.

Despite the fact that much of the habitat appears to be in good condition, future prospects must be given a negative assessment due to the ongoing damage caused by vehicles, small-scale dumping and recreational use. As the damage is currently not severe, nor likely to be in the short-term, future prospects are rated as *unfavourable-inadequate*. The status of the transition zones to saltmarsh, and freshwater or fen vegetation are notable features of the machair and should be included in the indicators of local distinctiveness for the site. Any impacts that threaten their integrity in the future should be considered as a negative factor in the assessment of habitat future prospects.

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 in the proposed Irish system is *unfavourable-unchanged*, reflecting the probable long-term existence of several negative impacts in the habitat.

Fixed Dunes (H2130)

Erosion at the seaward edge of the habitat may be largely due to wind and wave action, although damage along the main access track and from livestock trampling has apparently added to the problem. Overgrazing was not considered to be a problem at the site, although the recent grazing pressures at the site have probably been very close to the limit beyond which the dunes would have to be considered overgrazed. The existence of supplementary feeding stations and shelters, however, has created localised damage and added to the affects of natural erosion. As the damage is not severe, extent is regarded as *unfavourable- inadequate*.

Four monitoring stops were carried out in an assessment of fixed dune structure and functions. All four stops passed, indicating a *favourable* conservation status rating for the habitat. The monitoring stops reflected the reasonably high species diversity that characterised much of the habitat. Each of the stops had a negative indicator species component, which in all cases was solely comprised of

Senecio jacobaea (Common ragwort). In one instance, the cover of *S. jacobaea* exceeded the 5% limit, although all other attributes in that stop met the required targets. Another monitoring stop had an excessive (20%) bare ground component, reflecting the somewhat eroded nature of the habitat, although all other targets were also met in this stop.

Future prospects are rated *unfavourable- inadequate* due to the ongoing issues of supplementary feeding of livestock and erosion in and around vehicle and pedestrian tracks.

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

Due to the probable long-term existence of several negative impacts in the habitat, the assessment thought most appropriate in the proposed Irish system is *unfavourable-unchanged*.

Mobile Dunes (H2120)

Although mobile dunes are present along the full length of the seaward dune edge, a certain amount of erosion has been caused by, or exacerbated, by pedestrian traffic (particularly around access points) and livestock trampling. A number of breaches at the front edge of the dunes are clearly visible on the site aerial photographs. As the damage is significant, but not particularly severe, extent is rated as *unfavourable-inadequate*.

Table 121C Conservation status of Annex I sand dune habitats at Srah South

Habitat[1]	**EU Conservation Status Assessment**			**Overall EU conservation status assessment**	**Proposed Irish conservation status system**[2]
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**		
Machair (21A0)	Extent/ Structure & Functions	Future prospects		**Unfavourable - Inadequate**	**Unfavourable - unchanged**
Fixed Dunes (H2130)	Structure & Functions	Extent/ Future prospects		**Unfavourable - Inadequate**	**Unfavourable - unchanged**
Mobile Dunes (H2120)	Structure & Functions	Extent/ Future prospects		**Unfavourable - Inadequate**	**Unfavourable - unchanged**

[1] EU Codes as per Interpretation Manual

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

All four monitoring stops carried out in mobile dunes passed the overall target criteria indicating *favourable* structure and functions. Each stop had a substantial cover of *Ammophila arenaria* (Marram), of which only a negligible proportion was considered to be in poor or unhealthy condition. Two of the stops had a negative indicator species component, which in both cases was comprised of *Senecio jacobaea* (Common ragwort), some of which had attained flowering and fruiting proportions. However, in neither case was the 5% cover limit exceeded.

Future prospects for the habitat cannot be considered *favourable*, due to the continuing influence of the pressures - such as livestock trampling and the concentration of pedestrian traffic around access points - that has already resulted in some damage. As the threat to the habitat is not particularly severe, future prospects are considered to be *unfavourable-inadequate*.

A combination of *favourable* and *unfavourable-inadequate* assessments for the individual parameters of conservation status assessment indicates an overall *unfavourable-inadequate* assessment.

Table 121D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Srah South

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Machair (21A0)	4	0	**Favourable**
Fixed Dunes (H2130)	4	0	**Favourable**
Mobile Dunes (H2120)	4	0	**Favourable**

The corresponding assessment thought most appropriate under the proposed Irish conservation system is *unfavourable-unchanged*, as the type of damage observed in the habitat is likely to have existed for some time.

Coastal Monitoring Project 2004-2006

Srah South

CMP code: 121

Mullet / Blacksod Complex (SAC 470)

This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated areas are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 5953)

Date of production: 25/11/2008
Map version: 1

Original Drawing Size: 297 x 420 (A3)
Scale 1:11024

National Parks and Wildlife Service

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

SITE DETAILS

CMP06 site name: **Srah North** CMP06 site code: **122** CMP Map No.: **119**

County: **Mayo** Discovery map: **22** Grid Reference: **F 726 265**

6 inch Map No.: **Ma 17**

Aerial photographs (2000 series): **O1168-B; O1169-A, C**

NPWS Site Name: **Mullet / Blacksod Complex**

NPWS designation: pNHA: **470** cSAC: **470** SPA: **4037**

Ranger Area: **Mayo**

MPSU Plan**: Draft 2: Consultation**

Report Author: **Kieran Connolly**

SITE DESCRIPTION

Srah sand dunes, separated into Srah North and Srah in the NPWS sand dune site inventory and treated as such in the present report, are on the eastern side of Blacksod Bay, approximately 4km from Bunahowen village. Trawmore Bay, in the inner of Blacksod Bay, lies to the north of Srah. Both sites are included, as are Dooyork (site 119) and Doolough (site 120) to the south, in the Mullet/Blacksod Complex cSAC. Also in the same cSAC are the four large sites on the western side of the Mullet Peninsula – Aghleam (site 124), Leam Lough (site 125), Cross Lough (site 126) and Termoncarragh Lough (site 127).

The Mullet/Blacksod Complex was proposed as a cSAC due to the presence of three priority Annex I habitats – machair, fixed dune, and decalcified dunes with Empetrum nigrum, although there is some doubt as to whether the latter habitat is still present at its previously reported location. Machair and fixed dune are present at Srah North and Srah South and together comprise the greater part of the sand dune habitats at Srah North (Table 122A). Much of the total cSAC area – an estimated 60% in the NATURA 2000 standard data form – is accounted for by marine areas and sea inlets, while the machair and sand dune component (including sand beaches) was estimated there as comprising 16% of the total area. The other habitat class that represents a significant proportion of

the total cSAC area is that which encompasses tidal rivers, estuaries, mud flats, sand flats and lagoons.

Srah North is contiguous with Srah South South (site 121 in the present report) and the boundary between the sites, arbitrarily positioned for the purposes of the present report on a road near the centre of the dune system, is included as a theme on the accompanying site digital map.

The sand dune habitats at Srah North mostly consist of low sandhills at the western edge of the mainland, to the landward side of which lies a flat, sandy plain, now divided into small agricultural fields. Further sand dune habitat is found on a tombolo that links the mainland with Claggan - formerly an island lying northwest of the mainland. The tombolo formerly supported a more substantial expanse of dune habitat, including a small area of machair, but has now been greatly eroded to the extent that is retains only remnants of sand dune habitats and nothing that can be considered as machair. On Claggan itself there is a small patch of dune grassland on the eastern side.

The areas of sand dune habitats mapped at Srah North are shown in Table 122A. Much of the total area consists of machair, the habitat to which the small, sandy fields on the landward side of the sand hills have been assigned. The remainder is comprised of fixed dunes and smaller areas of foredunes - both embryonic dunes and mobile dunes.

Table 122A Areas of EU Annex I habitats mapped at Srah North

EU Code	EU Habitat	Area (ha)
H2110	Embryonic shifting dunes	0.461
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	1.630
H2130	Fixed coastal dunes with herbaceous vegetation	5.987
H21A0	Machair	21.761
	Total Sand dune	**29.839**

The sand hills on the mainland portion of the site and the tombolo linking the mainland to Claggan are not managed for agricultural purposes, and this, together with the scenic nature of the site, makes it attractive for recreational purposes. The site is readily accessed along public roads and the availability of car parking areas also draws visitors to the site.

Machair (H21A0)

Bassett (1983) included Srah North among a survey of Irish machair sites. She reported that the soils at Srah had high a pH, low organic matter and at 13.5%, a relatively low level of calcium carbonate. The area referred to as machair in that survey was on the north side of the tombolo linking Claggan with the mainland. This area has clearly been greatly eroded since that survey, as there are now only very small remnants of dune grassland behind the narrow foredunes and nothing that can reasonably be considered as machair remains. There are no references in that survey to the machair areas mapped in the present. Probably due to its inclusion in the survey by Bassett (1983), Srah North is on the NPWS sand dune site inventory as a machair site, although it was not included in the Biomar machair survey of 1996 (Crawford *et al*.).

The area mapped as machair here consists of small fields fenced roughly perpendicular to the strand, that lie on the landward side of the small sand hills. This area was not considered to be machair in previous surveys and its inclusion here may be questioned on the basis of a number of the criteria that are generally thought necessary for the recognition of the habitat. Firstly, its status as a mature, coastal plain has not been firmly established, leaving open the possibility that it is of relatively recent origins. Secondly, the data on soil pH, organic matter content and calcium carbonate levels (Bassett, 1983) may not be relevant to this particular area, which suggests that these criteria, which are also fundamental in the recognition of machair, may not display the typical range of values here. The area in question is now intensively managed for agricultural purposes, and the degree of modification that has occurred makes it difficult to assess the natural vegetation structure and composition that may have preceded an intensification of land management.

Nevertheless, it is included as machair here on the basis of being a more or less level, sandy, coastal plain, and having been subject to human interference, principally by grazing, during the recent historical period. Most of the area is now intensively managed for agricultural purposes - both grazing and the production of winter fodder - and the natural vegetation can be assumed to have been greatly modified throughout.

Species diversity was generally not high throughout the habitat, due to the agricultural improvements that have been implemented. However, several typical machair species were present and among the more common of these were *Achillea millefolium* (Yarrow), *Bellis perennis* (Daisy), *Cerastium fontanum* (Common mouse-ear), *Galium verum* (Lady's bedstraw), *Lotus corniculatus*

(Common Bird's-foot-trefoil), *Plantago lanceolata* (Ribwort plantain), *Prunella vulgaris* (Selfheal) and *Trifolium repens* (White clover).

In wetter areas, species such as *Anagallis tenella* (Bog pimpernel), *Carex flacca* (Glaucous sedge), *Carex nigra* (Common sedge), *Hydrocotyle vulgaris* (Marsh pennywort) and *Potentilla anserina* (Silverweed) were present.

A number of 'meadow' grasses were also common, reflecting the agricultural management of the habitat, and among the most common of these were *Anthoxanthum odoratum* (Sweet vernal-grass), *Cynosurus cristatus* (Crested dog's-tail) and *Holcus lanatus* (Yorkshire-fog).

Bryophyte cover was generally not particularly high: the more common moss species noted were *Brachythecium* sp., *Calliergonella cuspidata*, *Rhytidiadelphus squarrosus* and *Rhytidiadelphus triquetrus*.

Fixed Dunes (H2130)

Fixed dunes at the site consist of the low sandhills that lie on the seaward side of machair in the eastern side of the site, a small strip of habitat along the remnant dunes on the tombolo linking the mainland to Claggan, and a small patch of dune grassland on the east side of Claggan.

The sand hills in the mainland part of the site have been adversely affected by trampling and other damage brought about by recreational use. The location of the sand hills at the end of the main access road into the site is a major factor in causing disturbance to the habitat. Fixed dunes along the tombolo have, along with the other sand dune habitats here, probably diminished over the years, as erosion has accounted for a large amount of habitat. Coastal protection works may have stabilised the dune habitats, although the dune grassland here is currently no more than a remnant of a previously more extensive and intact habitat.

Species diversity was generally not high throughout the habitat, although several of the typical fixed dune species were found. The more common herbaceous species in the *Festuca rubra* (Red fescue)-dominated sward included *Carex arenaria* (Sand sedge), *Cerastium fontanum* (Common mouse-ear), *Euphrasia officinalis* agg. (Eyebright), *Hypochaeris radicata* (Cat's ear), *Lotus corniculatus* (Common Bird's-foot-trefoil), *Luzula campestris* (Field wood-rush) and *Plantago lanceolata*

(Ribwort plantain). Among other species noted were *Achillea millefolium* (Yarrow) and *Arenaria serpyllifolia* (Thyme-leaved sandwort).

In the absence of grazing livestock, the fixed dune sward was long and somewhat rank in places, although there were also short turf areas where species diversity was generally higher.

Mobile Dunes (H2120)

Mobile dunes form a continuous narrow strip over almost the entire length of the seaward side of the dunes and have a total area of 1.63ha (Table 122A). The habitat was characterised by the presence of *Ammophila arenaria* (Marram), which in places - particularly along the tombolo linking Claggan to the mainland - was comprised of mostly healthy material, while elsewhere, a lack of sediment mobility was reflected in an excessive cover of dead or unhealthy Marram. Although sand-trapping measures installed along the east side of the tombolo may be at least partly responsible for the accretion of foredune grasses there, some of the habitat - particularly near Claggan - consisted of only a narrow strip of *A. arenaria* (Marram) at the foot of a steeply eroded face of the remnant dune grassland, and may prove to be only temporary in nature.

Embryonic Dunes (H2110)

Embryonic dunes at Srah North - characterised by the dominance of *Elytrigia juncea* (Sand couch) - formed a continuous strip of approximately 1km length, but were somewhat restricted in occurrence, being absent for a certain distance at each end of the site. Most of the current area of habitat is at the seaward side of the tombolo and may be largely attributable to the sand-trapping fencing and other coastal protection works that have been installed here.

IMPACTS

Activities observed or known to be impacting on the sand dune habitats at Srah North are shown in Table 122B.

Table 122B Intensity and impact of various activities on sand dune habitats at Srah North

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H21A0	103	A	-1	20	Inside
H21A0	143	A	-1	15	Inside
H2130	149	C	-1	2	Inside
H21A0	171	A	-1	1	Inside
H2130	501	A	-1	0.5	Inside
H2120	622	A	-1	0.4	Inside
H2130	622	A	-1	1.5	Inside
H21A0	622	B	-1	4	Inside
H2130	623	A	-1	0.5	Inside
H2110	871	B	0	Unknown	Inside
H2120	871	B	0	Unknown	Inside
H2130	871	B	0	Unknown	Inside
H2110	900	A	0	Unknown	Inside
H2120	900	A	0	Unknown	Inside
H2130	900	A	0	Unknown	Inside

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

Almost the entire area mapped as machair has seen substantial agricultural improvements (code 103) by methods including the re-seeding of swards and fertiliser application. The division of the machair plain into small, individually owned fenced strips generally ensures a more intensive use of the land than would apply if it were an unfenced commonage with multiple owners. In addition to the current abundance of 'agricultural' grasses, such as *Lolium perenne* (Perennial rye-grass), there are several areas of dense weed growth, in which the most common species include *Cirsium vulgare* (Spear thistle) and *Senecio jacobaea* (Common ragwort). The proliferation of nitrophilous weed species is at least partly attributable to the supplementary feeding of animals (code 171) that typically leads to localised patches of soil enrichment.

Cattle are the principal grazers in the fenced machair fields and as such, overgrazing by cattle (code 143) reflects the high stocking densities throughout a substantial part of the habitat.

Undergrazing (code 149), referring to the grassland remnants on the narrow tombolo, is included on the list of impacts, although grazing is currently not a realistic option due to present condition and management of the area, in which fencing and other sand-trapping mechanisms are given priority importance. There were no clear indications that rabbits formed a significant element of the grazing population at the site.

Recreational pressures (coded 622) are apparently considerably greater at Srah North than at Srah South. The location is highly scenic and obviously attractive to walkers and other visitors, and is readily accessible along public roads and tracks that lead to the strand. During the site visit several cars were parked in an open area near the strandline and also along the access track leading to the beach (code 623). Among the consequences of vehicle access to the site are compacted soil and the erosion of vegetation cover. Cars can also access the sand flats on the northern side of the tombolo and a number of vehicles were seen there during the site visit.

Coastal protection measures (code 871) in the form of fencing (including access control fencing and sand-trapping fencing), Marram planting and dune reconstruction using gabions and geotextile fabrics have been put in place along the tombolo linking the mainland to Claggan by the Department of the marine and natural resources. The scale of erosion over time can be seen by a comparison of the present habitat map with the site 6'' map that is included as a theme on the digital habitat map accompanying this report. The earlier map indicates a far more substantial body of sand hills there in previous times than currently exists, although several cycles of erosion and accretion could have occurred in the period between the making of that map and the present day, such is the likely time period of its production. Coastal erosion is recorded as having a neutral impact on the affected habitats (Table 122B), as the positive benefits of stabilising the eroding habitats are offset by the interference with the natural dynamics of the system, which should generally be regarded as a negative impact.

Much of the erosion that has occurred at the site - most noticeably along the already narrow tombolo - can be attributed to natural wind and wave action (code 900). As is typical of this impact, the areas affected cannot be reliably determined and are recorded as 'unknown'. This is particularly so, as there are no recent habitat extent data and maps that could be used for the purposes of comparison with the present results.

CONSERVATION STATUS

The conservation status assessment of habitats is based on a combination of extent, structure and functions and future prospects assessments (Table 122C). Structure and functions assessments were determined on the basis of monitoring stops pass/failure rates (Table 122D).

Srah North is within the Mullet/Blacksod Complex cSAC, although as only one of eight significant sand dune systems within the site, the information contained in previous reports - such as the NATURA 2000 standard data file - is of little use for the purposes of comparison with the present data. The estimated percentage cover for each habitat in that report refers to the cSAC as a whole, rather than the individual sand dune sites which make up the sand dune habitat content of the site. Explanatory notes also tend to refer more substantially to the larger dunes within the cSAC, with little or no information provided for the smaller or less important sites. As a result of the lack of previous data, much of the conservation status assessment of habitats here is based on the current condition of the habitats.

Machair (H21A0)

Srah North was not among the sites dealt with in the Biomar machair survey of 1996 (Crawford *et al*.), and while it was included in an earlier machair survey by Bassett (1983), the area discussed in that survey referred to a stretch of habitat along the tombolo that has since been reduced to no more than a small remnant of what previously existed.

Most of the machair is divided into small, narrow fields, fenced roughly perpendicularly to the strand. The individual field boundaries are indicated in the 'habitats' theme in the site digital map. During the site survey the condition of each field was visually assessed, as many of the fields are managed quite differently and have been improved to various degrees. At the time of the survey, each field was rated as being in either *favourable* or *unfavourable* condition and those in *unfavourable* condition rated as either *restorable* or *not restorable*. Although the latter assessment may now be considered defunct - following discussions with NPWS staff during which it was decided that no habitat which has not been permanently destroyed should be thought of as not restorable - it retains some usefulness as a measure of the general condition of each field. These assessments are accessible in the 'Fields' theme table in the site digital map.

Habitat extent (area) is rated as *favourable*, as there are no previous surveys in which the extent of the machair area mapped here was assessed. There are also no clear indications of any recent loss of area through recreation or other pressures.

Of the four monitoring stops used to assess machair structure and functions, two passed and two failed the overall assessment - a pass rate of 50% that indicates *unfavourable-bad* structure and

functions. As much of the habitat area is used intensively for agricultural purposes, there were parts that lacked species diversity (plant and/or bryophyte), had an excessive cover of negative indicator species or were overgrazed and consequently had no significant flowering and fruiting of typical species.

Future prospects for the habitat must be considered *unfavourable-bad*, as almost the entire area is used quite intensively for livestock rearing.

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

The rating thought most appropriate under the Irish system of assessment is *unfavourable-declining*, as intensive agricultural use is likely to cause an ongoing decline in the habitat.

Fixed Dunes (H2130)

In the absence of any recent habitat extent data that may be used for the purposes of comparison with the present results, fixed dune extent (area) is rated as *favourable*. Although the dune grassland area along the tombolo leading to Claggan is known to have eroded in recent times, most of decline may be pre-1996 (the starting date for the period of assessment and reporting used here) and is therefore not factored into the current assessment of extent.

Only two monitoring stops, of which one passed and one of which failed the overall required standard, were carried out in the limited fixed dune area at the site. A 50% monitoring stop failure rate indicates *unfavourable-bad* structure and functions.

The installation of coastal protection works has, to some extent, stabilised the small amount of dune grassland along the tombolo. However, any measurers that interfere with the natural sediment dynamics should not be viewed uncritically as a positive development. In any case, as much of the habitat at the site is susceptible to the negative affects of high recreational use, future prospects are considered to be *unfavourable-inadequate*.

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

The rating chosen under the Irish system of assessment is *unfavourable-unchanged* (Table 122C), reflecting the view that the habitat has probably been in a similar condition for some time.

Table 122C Conservation status of Annex I sand dune habitats at Srah North

Habitat[1]	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system[2]
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**		
Machair (21A0)	Extent		Structure & Functions/ Future prospects	**Unfavourable - Bad**	**Unfavourable - declining**
Fixed Dune (H2130)	Extent	Future prospects	Structure & Functions	**Unfavourable - Bad**	**Unfavourable - unchanged**
Embryonic Dune (H2110)	Structure & Functions	Extent/ Future prospects		**Unfavourable - Inadequate**	**Unfavourable - unchanged**
Mobile Dunes (H2120)	Extent	Future prospects	Structure & Functions/	**Unfavourable - Bad**	**Unfavourable - unchanged**

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

Mobile Dunes (H2120)

In the absence of any recent directly comparable habitat extent data with which the current results may be compared, the mobile dune extent assessment is mostly based on the current condition of the habitat. As there is a thin band of habitat along almost the entire length of the site, extent is rated as *favourable*.

Two monitoring stops were deemed sufficient for the limited area of mobile dune at the site, and of these, only one passed the overall required criteria - a 50% pass rate that indicates *unfavourable-bad* vegetation structure and functions. An excessive cover of unhealthy *Ammophila arenaria* (Marram) explains the failure to meet the overall pass target in the failed monitoring stop. The presence of a significant amount of unhealthy plant material is generally indicative of a lack of mobility in the system.

Mobile dune future prospects are rated as *unfavourable-inadequate*, as most of the habitat is within an area of high recreational use and is subject to damage from trampling. A significant portion of the current habitat area may be due to the installation of coastal protection measures, although this should not necessarily be seen as a positive step, due to the disruption to the natural system dynamics that this entails.

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

The rating chosen under the Irish system of assessment is *unfavourable-unchanged*, as the habitat can be assumed to have been in a similar condition for some time.

Table 122D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Srah North

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Machair (21A0)	2	2	**Unfavourable - Bad**
Fixed Dunes (H2130)	1	1	**Unfavourable - Bad**
Embryonic Dunes (H2110)	2	0	**Favourable**
Mobile Dunes (H2120)	1	1	**Unfavourable - Bad**

Embryonic Dunes (H2110)

As is the case with the other habitats at the site, there are no recent habitat extent data with which those produced here may be directly compared. The habitat extent assessment is therefore based primarily on the current condition of the habitat. As the habitat is absent along significant portions of the seaward edge of the dunes, extent is rated as *unfavourable-inadequate*.

Structure and functions are *favourable*, as both of the monitoring stops carried out in the habitat passed the overall criteria.

Foredune habitats at the site are quite susceptible to the negative affects of recreational pressures. A car parking area at the eastern end of the tombolo linking the dunes to Claggan (and also along the

track leading to the strand) encourages a considerable amount of recreational use and will continue to result in damage to the dune habitats. Future prospects are therefore considered to be *unfavourable-inadequate*. Coastal protection measures, which may have stabilised the eroding tombolo, cannot be viewed in only a positive light, as all such installations result in a disruption to the natural system dynamics, which should be seen as undesirable.

A combination of *favourable* and *unfavourable-inadequate* assessments for the individual parameters of conservation status assessment indicates an overall *unfavourable-inadequate* assessment.

The rating chosen under the Irish system of assessment is *unfavourable-unchanged*, as the habitat can be assumed to have been in a similar condition for some time.

Oifreann, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government
National Parks and Wildlife Service

Coastal Monitoring Project 2004-2006

Srah North

Mullet / Blacksod Complex (SAC 470)

CMP code: 122

This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated areas are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 5953)

0 100 200 300 400 500 Meters

Date of production: 25/11/2008
Map version: 1

Original Drawing Size: 297 x 420 (A3)
Scale 1:13111

N

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

SITE DETAILS

CMP06 site name: **Leam Lough** CMP06 site code: **125** CMP Map No.: **122**

County: **Mayo** Discovery map: **22** Grid Reference: **F 637 263**

6 inch Map No.: **Ma 16 &24**

Aerial photographs (2000 series): **O1105-D; O1106-C; O1166-B, D; O1167-A, C; O1232-B; O1233-A**

NPWS Site Name: **Mullet / Blacksod Complex**

NPWS designation: pNHA: **470** cSAC: **470** SPA: **4037**

Blue Flag Beach: **Elly Bay / Mullaghroe**

Ranger Area: **Mayo**

MPSU Plan**: Draft II – Consultation (2001)**

Report Author: **Kieran Connolly**

SITE DESCRIPTION

Leam Lough, on the Mullet Peninsula in northwest Mayo, extends over almost 4km of coastline, from Barrettsplot West in the north to Urdcarrig in the south. It is contiguous with Cross Lough (site 126 in the present report) to the north and Aghleam (site 124) to the south. The boundaries between the sites (the locations of which are arbitrarily chosen here) are included as a theme on the digital habitat map that accompanies this report. Termoncarragh Lough (site 127), to the north of Cross Lough, completes the list of sand dune sites on the Mullet Peninsula. All are included in the Mullet/Blacksod Complex cSAC, which comprises much of the Mullet Peninsula, the sheltered waters of Blacksod Bay and some sandy coastline on the eastern side of Blacksod Bay. Srah South (site 121), Srah North (site122), Doo Lough (site 120), and Dooyork (site119), on the eastern side of Blacksod Bay, complete the list of significant sand dune sites in the cSAC, and all are included in the present report.

Much of the total cSAC area – an estimated 60% in the NATURA 2000 standard data form – is accounted for by marine areas and sea inlets, while the machair and sand dune component (including sand beaches) is estimated as 16% of the total area. The other habitat class that

represents a significant proportion of the total area is that which encompasses tidal rivers, estuaries, mud flats, sand flats and Lagoons.

The site was proposed for cSAC designation due to the presence of Machair, Fixed coastal dunes with herbaceous vegetation, and Decalcified fixed dunes with *Empetrum nigrum* – all priority Annex I habitats. However, although machair and fixed dunes comprise a significant proportion of sand dune habitats, the status of *Empetrum nigrum* heath is less clear. The habitat was known from Termoncarragh Lough, but is apparently either no longer present or too small and damaged to be considered significant. The issue is discussed in the Termoncarragh Lough (CMP site 127) report.

Fixed dunes account for much of the total sand dune area of Leam Lough, while machair also forms a significant proportion of the site. The other Annex I sand dune habitats mapped at Leam lough were 'Embryonic shifting dunes', 'Shifting dunes along the shoreline with *Ammophila arenaria*' and 'Humid Dune Slacks' (Table 125A). There were no strandline habitats mapped at the site.

- **Table 125A** Areas of EU Annex I habitats mapped at Leam Lough

• **EU Code**	• **EU Habitat**	• **Area (ha)**
H2110	Embryonic shifting dunes	0.217
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	2.362
H2130	Fixed coastal dunes with herbaceous vegetation	171.752
H2190	Humid Dune Slacks	1.350
H21A0	Machair	45.570
	• **Total Sand dune**	**221.251**

The Mullet/Blacksod Bay Complex holds large expanses of machair, including some of the largest and most important sites in the country. However, Leam Lough was the only Mullet Peninsula sand dune site not included in the recent Biomar Machair survey (Crawford *et al*., 1996), reflecting the fact that it is the least extensive and probably least important machair of the Mullet sites.

In recent years the conservation value of sand dune habitats – particularly that of machair - throughout the Mullet Peninsula has been significantly compromised by the restructuring of large areas of dune grassland from unenclosed commonage grazing areas, into individually owned, small striped fields. The major affect of shareholders assuming control of their own land has been an intensification of agricultural practices, among which are overgrazing, supplementary feeding of livestock, fertiliser application and re-seeding of swards. The undesirable consequences of this

include erosion, the replacement of species-rich swards with species-poor swards dominated by coarse grasses, and the spread of nitrophilous weed species. Evidence of these adverse developments can be seen at Leam Lough, although perhaps not as starkly as at some other machair locations on the Mullet Peninsula.

Included in the NATURA 2000 network are the three SPA's (Special Protection Areas) of Cross Lough, Termoncarragh Lake and Blacksod Bay/Broadhaven, the combined area of which holds internationally important numbers of Whooper swan, Barnacle Goose, Great Northern Diver and Light-Bellied Brent Goose, as well as nationally important numbers of several other species. Eighteen migratory or breeding species listed under Annex I of the EU Birds Directive are known from the site, including species such as Corncrake, Golden Plover, Greenland White-fronted Goose, Red-necked Phalarope and Ruff. Although the sand flats and marine areas of Blacksod Bay that lie adjacent to Leam Lough are within the total SPA area, none of the actual sand dune area forms a component of the Mullet SPA territory.

Mammal species known from the cSAC that are listed under Annex II of the EU Habitats Directive include Otter (*Lutra lutra*), Common Seal (*Phoca vitulina vitulina*) and Grey Seal (*Halichoerus grypus*).

Hares (*Lepus timidus hibernicus*), foxes (*Vulpes vulpes*) and common frogs (*Rana temporaria*) were all seen in various parts of the site during the present survey.

The Garden chafer beetle (*Phyllopertha horticola*) was notably common at the site.

The rare liverwort *Petalophyllum ralfsii* (Petalwort) is known from within the cSAC, but has not been recorded at Leam Lough.

Machair (H21A0)

Machair at Leam Lough consists of an area in the northern half of the site where a flat plain is divided into eleven narrow fields, fenced more or less perpendicular to the shore, and another flat to undulating plain at the southern extreme of the site. The habitat mapped in the northern half of the site appears to have been overlooked or possibly not considered to be machair in some previous surveys. A 'gross habitat map' of the site in the NPWS site files - based on 1993 and 1995 aerial

photographs, the NHA site card for the site and fieldwork carried out in the production of the map - only depicts machair at the southern end of the site. It is mapped here as machair as it appears to fulfil most of the conditions necessary for the recognition of machair (Curtis, 1991b), including that of being a coastal plain with a more or less level surface. However, it is not altogether clear why it has not previously been considered as machair. There remains the possibility that the flat topography of the area could have resulted from large-scale earth-moving operations, that may have occurred during the upheaval that has occurred throughout the Mullet Peninsula in recent times, whereby intensive agricultural management practices have been widely introduced following the division of commonages into individually owned, fenced strips. However, there is apparently no evidence to suggest that this occurred.

Much of the machair at the site is in quite good condition, with most parts of the habitat, including most of the small, fenced fields in the northern half of the site, having only localised areas of damage. Nevertheless, species diversity is not particularly high throughout much of the habitat, although many of the typical machair species were noted. Among the more common species in dry grassland were *Achillea millefolium* (Yarrow), *Bellis perennis* (Daisy), *Carex arenaria* (Sand sedge), *Cerastium fontanum* (Common mouse-ear), *Cynosorus cristatus* (Crested dog's-tail), *Euphrasia officinalis* agg. (Eyebright), *Plantago lanceolata* (Ribwort plantain) and *Trifolium repens* (White clover).

Damp or wet areas were also common through substantial parts of the habitat. Common species noted in these areas included *Carex flacca* (Glaucous sedge), *Eleocharis quinqueflora* (Few-flowered spike-rush), *Hydrocotyle vulgaris* (Marsh pennywort), *Prunella vulgaris* (Selfheal) and *Ranunculus flammula* (Lesser spearwort).

Fixed Dunes (H2130)

Fixed dunes, which cover a total area of 171.752ha, account for a large proportion of the total sand dune area at Leam Lough. The habitat covers a continuous expanse through much of the site, and is absent from only the most southerly end, where machair dominates. Much of the fixed dune area is cattle-grazed, while horses and donkeys are also present in lesser numbers. A small amount of habitat on the seaward (west) side of the site is of a semi-fixed nature, with a more open structure, abundant *Ammophila arenaria* (Marram) and fewer typical fixed dune species. There is little foredune development at the site, particularly in the north end, and fixed dunes frequently extend to the seaward edge of the dunes.

As much of the habitat consists of narrow striped fields, there are numerous management regimes, and therefore considerable variation in habitat quality. Several of the factors associated with the intensification of agricultural practices that can be observed throughout the Mullet sand dunes also apply to the fixed dunes at Leam Lough. Ring feeders, used in the supplementary feeding of livestock, are a regular feature, and the familiar consequences of severely poached or bare soil, and high incidences of nitrophilous weed species such as *Cirsium vulgare* (Spear thistle), *Stellaria media* (Common chickweed) and *Urtica dioica* (Common nettle) are commonly seen. Common ragwort, *Senecio jacobaea*, is present throughout the fixed dunes, but is generally not very common. The reseeding of species-rich swards with more agriculturally productive species such as *Lolium perenne* (Perennial rye-grass) has also become common, as has the application of fertilisers.

Nevertheless, much of the fixed dunes have been relatively unaffected, and considerable areas are still in a favourable conservation condition, with sustainable grazing regimes and minimal damage from agricultural practices. There are significant areas of species-rich short turf, which hold a good diversity of typical species. The more commonly encountered species include *Anthyllis vulneraria* (Kidney vetch), *Bellis perennis* (Daisy), *Carex arenaria* (Sand sedge), *Cerastium fontanum* (Common mouse-ear), *Daucus carota* (Wild carrot), *Euphrasia officinalis* agg. (Eyebright), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Hypochaeris radicata* (Cat's ear), *Lotus corniculatus* (Common Bird's-foot trefoil), *Luzula campestris* (Field wood-rush), *Plantago lanceolata* (Ribwort plantain), *Ranunculus bulbosus* (Bulbous buttercup), *Rhinanthus minor* (Yellow-rattle), *Thymus polytrichus* (Wild thyme) and *Trifolium repens* (White clover).

Other less common, though regular elements of the flora included *Arabis hirsuta* (Hairy Rock-cress), *Geranium molle* (Dove's foot Crane's-bill), *Leucanthemum vulgare* (Oxeye daisy), *Polygala vulgaris* (Common milkwort), *Primula vulgaris* (Primrose) and *Viola tricolor* Ssp. *curtisii* (Wild pansy).

Among the commoner mosses noted were *Brachythecium* sp., *Homalothecium lutescens*, *Rhytidiadelphus squarrosus*, *R. triquetrus* and *Tortula ruraliformis*.

- **Dune Slacks (H2190)**

There are a number of dune slacks scattered throughout the fixed dunes, most notably to the southwest of Elly Bay, where three relatively large separate slack areas were mapped. Other smaller

slacks were mapped near the north end of Elly Bay and near the northern boundary of the site. Most of the slacks were of a wet type although a few appeared to be somewhat drier, with a more extensive cover of *Salix repens* (Creeping willow) and greater diversity of typical fixed dune species. Most of the slacks were relatively undamaged, although there were some indications of overgrazing and a degree of poaching noted in a number of them. Another indication of susceptibility to intensive livestock rearing practices was the regular occurrence of the negative indicator species, *Lolium perenne* (Perennial rye-grass) and *Senecio jacobaea* (Common ragwort).

Among the typical dune slack species noted were *Calliergonella cuspidata*, *Carex flacca* (Glaucous sedge), *Hydrocotyle vulgaris* (Marsh pennywort), *Mentha aquatica* (Water mint), *Potentilla anserina* (Silverweed), *Ranunculus flammula* (Lesser spearwort) and *Salix repens* (Creeping willow). Also found in the two most southerly slacks was *Ophioglossum vulgatum* (Adder's-tongue).

- **Mobile Dunes (H2120)**

Mobile dunes at the site are largely confined to the southern end of the site, where a continuous strip of approximately 1.4km in length was mapped. A further small strip of approximately 200m was mapped near the northern boundary of the site. The habitat was characterised by the presence of *Ammophila arenaria* (Marram). Other species noted included *Eryngium maritimum* (Sea-Holly), *Tussilago farfara* (Colt's-foot) and *Calystegia soldanella* (Sea bindweed), all of which were also typical of semi-fixed dune habitat.

The mobile dunes rarely exceeded 20m in width, and in places were of a rather poor quality, with a significant proportion of unhealthy *Ammophila arenaria* (Marram). The eroded front face of the fixed dunes was often quite high (over 5m over the beach level) and steep. Much of the habitat mapped as mobile dune is on the face of this eroded front edge, where Marram has colonised the bare sand and stabilised the eroded dunes. As such, there is little in the way of actually accreting mobile dunes and much of the current habitat can be attributed to the availability of locally recycling sediment.

- **Embryonic Dunes (H2110)**

Embryonic dunes were confined to the southern end of the site, where a continuous narrow band of approximately 350m in length lay to the seaward side of mobile dune habitat.

The habitat was characterised by the presence of *Elytrigia juncea* (Sand couch). A cobble ridge on the landward side of a portion of the habitat provides an obstacle to sediment movement, and may explain the less than vigorous growth of foredune grasses in this area. The general lack of foredune development at the site can be seen as a consequence of sediment depletion (the affects of which are apparent throughout the Mullet Peninsula) and erosion. What foredunes there are at the site are probably attributable to the availability of a certain amount of locally recycling sediment.

IMPACTS

Activities observed or known to be impacting on the sand dune habitats at Leam Lough are shown in Table 125B.

As is the case throughout much of the Mullet peninsula sand dunes, the major factor affecting the conservation status of habitats in recent times has been the restructuring of agricultural land from unenclosed commonage grazing areas to small, individually owned striped fields (code 150). The practice has been most apparent in machair habitat, where the fields tend to be smaller, and the negative affects readily visible across the generally flat plains. As Leam Lough is probably the least important machair site on the Mullet Peninsula, the affects are less obvious, although machair in the northern half of the site has also been divided in this manner, as has much of the fixed dune habitat.

Table 125B Intensity and impact of various activities on sand dune habitats at Leam Lough

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H21A0	101	A	-1	0.1	Inside
H21A0	103	B	-1	25	Inside
H2130	103	B	-1	100	Inside
H21A0	120	A	-1	5	Inside
H2130	120	A	-1	50	Inside
H21A0	140	A	+2	30	Inside
H2130	140	A	+2	110	Inside
H21A0	143	B	-1	15	Inside
H2130	143	B	-1	60	Inside
H2190	143	B	-1	1.3	Inside
H2130	146	C	-1	5	Inside
H21A0	150	A	-1	16	Inside
H2130	150	A	-1	120	Inside
H21A0	171	A	-1	0.1	Inside
H2130	171	A	-1	1	Inside
H2130	300	A	-1	2	Inside
H2130	421	C	-1	0.1	Inside
H21A0	421	C	-1	0.1	Inside
H2130	422	B	-1	0.1	Inside
H2130	430	A	-1	2	Inside
H21A0	430	A	-1	0.2	Inside

H2120	622	C	-1	0.5	Inside
H2130	622	C	-1	5	Inside
H21A0	623	A	-1	1	Inside
H2130	623	A	-1	10	Inside
21BB	701	D	0	Unknown	Inside
H2120	900	A	0	Unknown	Inside
H21A0	900	A	0	Unknown	Inside
H2130	900	A	0	Unknown	Inside
H2130	954	C	-1	0.01	Inside

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

The inevitable result of dividing the land into small units where each stakeholder has ownership and control of their own land, is an intensification of agricultural activities (code 103). Among these is the change from a traditional seasonal grazing regime, to a situation where livestock are on the land all year. Stocking densities generally increase, and the grassland becomes overgrazed. Typical of the Mullet Peninsula, livestock grazing (and therefore overgrazing) at Leam Lough is mostly by cattle (code 143), although horses and donkeys also account for a small proportion of the total grazing.

To support a year round grazing system, supplementary feed (code 171), usually in the form of round-baled silage in ring feeders is provided for livestock. Animals crowding in small areas around feeders and troughs generally leads to severe localised erosion or poaching of the soil, and an increase in cover of nitrophilous weed species such as *Cirsium arvense* (Creeping thistle) and *Urtica dioica* (Common nettle). Coarse grass seeds may also be introduced in hay or silage. The construction of animal shelters (code 430) and enclosures for holding stock in field corners has also led to localised patches of damage.

Although overgrazing and overstocking are among the major problems at the site, grazing (code 140) can also be regarded as positive in some areas where stocking levels are lower, yet sufficiently high to maintain the short turf that tends to support a greater diversity of plant species, than other less well grazed, or rank, areas.

Rabbits are present at the site, and although their numbers were not notably huge during the site visits, they were sufficient to cause some erosion in the fixed dunes, primarily through burrowing

activities. Where stock grazing levels are excessive, the presence of rabbits tends to exacerbate the negative consequences of overgrazing (code 146).

Reseeding of swards with more productive grasses, and fertiliser application (code 120) also become more common in intensive livestock rearing systems, due to the necessity of improving the yield and quality of winter feed. A high percentage cover of agricultural grasses – most noticeably *Lolium perenne* (Perennial rye-grass) and *Dactylis glomerata* (Cock's-foot) – was typical of the more improved areas of dune grassland, and was apparent in a number of failed monitoring stops. Application of chemical fertilisers has apparently become more widespread throughout the Mullet sand dune sites, and has to a large extent replaced the low-intensity use of traditional fertilisers such as seaweed.

Tracks of agricultural vehicles (code 623) are quite common throughout the site and are particularly prevalent around feeders and troughs. Damage varies from slightly eroded and compacted soil, to severely eroded, bare and deeply rutted tracks, which occasionally traverse almost the entire length of fields.

An old cultivation plot (code 101) was noted in the fixed dunes. The presence of some vintage machinery, including a horse drawn potato digger, may indicate a long history of cultivation, although the area in question is very small.

Sand and shingle extraction (code 300) is known to have occurred in a number of locations throughout the Mullet sand dune sites. The materials are used for several purposes including the creation of tracks, and in the case of sand, as a fertiliser, due to its high shell content. The exact extent of the problem is difficult to quantify, as it most likely takes place on a small scale over many locations, and may only be discernible for a limited period after the event. Some small-scale removal of sand, apparently for agricultural purposes, was observed during one of the site visits. Another activity accounted for under the same impact code, was the re-shaping and enlargement of a naturally sheltered area on the lee side of a sand hill, for the purposes of livestock shelter and feeding, by the mechanical re-working and removal of sand.

Some small scale dumping (code 422) of articles such as obsolete machinery and corrugated metal panels was noted in the fixed dunes. Silage wrap remnants and household type waste (code 421) were noted in several locations.

As is typical of much of the Mullet Peninsula sand dunes, recreational impacts are relatively low, due primarily to the agricultural management of much of the area. Worn tracks and pathways, caused by walking and associated activities (code 622), can be observed at the site, although the total areas affected are almost insignificant. Walking and associated activities tend to be concentrated around access points.

A patch of *Phormium tenax* (New Zealand flax) had established in the fixed dunes (code 954), although the area affected was very small.

Water pollution (code 701) is included on the list of impacts although the extent and intensity of its possible affects on sand dune habitats are difficult to assess. However, it seems likely that run-off from fertiliser application will lead to some eutrophication of groundwater.

Several activities coming under the broad heading of fishing, hunting & collecting were included in the NATURA 2000 data form list of impacts, although none of these have any obvious direct influence on sand dune habitats.

A large area of dune grassland, including much of the machair zone in the southern end of the site has apparently undergone a significant change over recent decades. In previous years, when the tagging and identification of livestock may have been less strictly regulated than is now the case, animals were frequently left to graze for short periods (often in the days leading up to local markets) on what was then an open commonage area. The dune grassland in question became severely overgrazed and almost completely bare of vegetation. A local landowner recounted to the present author that the adjacent public road could be all but impassable at times, such was the volume of sand blowing eastwards from the adjacent unvegetated sand plain. The practice of grazing livestock in this manner, which was most prevalent in the 1970's, was discontinued with the introduction of stricter control of animal identification, and the transfer of land into individually owned shares. The grassland subsequently became re-vegetated and currently contains a reasonable proportion of species-rich short turf. As these events pre-dated several recent surveys and reports, they are not included in Table 125B, although the recent history of the area may provide a useful indication of the restoration possibilities of similarly damaged habitat elsewhere in Leam Lough and at other Mullet Peninsula sites.

CONSERVATION STATUS

The overall conservation status assessment of each habitat at Leam Lough is based on a combination of *Habitat Extent*, *structure & Functions,* and *future prospects* assessments (Table 125C). Details of the numbers and pass/failure rates of monitoring stops used to assess vegetation structure & functions are shown in Table 125D.

Information in NATURA 2000 plans and the site conservation (MPSU) plan is of little use for the purposes of comparison with the present data. The estimated percentage cover for each habitat in those reports refers to the cSAC as a whole, rather than the individual sand dune sites which make up the sand dune habitat content of the site. As the Mullet/Blacksod Complex contains eight individual sand dune sites from the NPWS sand dune inventory (Curtis, 1991a), the habitat extent data and explanatory notes are particularly limited in their usefulness for the purposes of comparison with the present data.

In any case, the methods used to estimate habitat areas are not comparable, as the site conservation plan contains approximations of habitat areas based on NHA site cards and field visits by the author of that site plan, whereas the areas reported here are based on GPS-generated maps and data.

Leam Lough was not included among the survey sites in the recent Biomar Machair survey (Crawford *et al*., 1996), nor in the earlier machair work by Bassett (1983), although it is on the existing NPWS sand dune site inventory as a machair site.

Machair (H21A0)

Machair at Leam Lough is probably the least important example of the habitat on the Mullet Peninsula in terms of extent. However, as there has been no obvious recent decline in extent, and because a previously overlooked tract of habitat has been incorporated into the mapped area, extent is rated as *favourable*.

All six monitoring stops carried out in machair passed the overall criteria, indicating *favourable* habitat structure and functions. All but one of the stops passed on all of the individual attributes, despite the fact that species diversity is not particularly high throughout the habitat. Several stops had a negative indicator species component – usually one or both of *Lolium perenne* (Perennial rye-grass) and *Senecio jacobaea* (Common ragwort) – although only one monitoring stop had a

combined cover of greater than 5% (the maximum allowable monitoring stop limit) for these species.

Table 125C Conservation status of Annex I sand dune habitats at Leam Lough

Habitat[1]	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system[2]
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**		
Machair (21A0)	Extent/ Structure & functions	Future prospects		**Unfavourable - Inadequate**	**Unfavourable - unchanged**
Fixed Dunes (H2130)	Extent	Structure & functions/ Future prospects		**Unfavourable - Inadequate**	**Unfavourable - unchanged**
Dune Slack (H2190)	Extent/ Structure & functions	Future prospects		**Unfavourable - Inadequate**	**Unfavourable - unchanged**
Mobile Dunes (H2120)		Structure & functions/ Future prospects	Extent	**Unfavourable - Bad**	**Unfavourable - unchanged**
Embryonic Dunes (H2110)	Structure & functions	Future prospects	Extent	**Unfavourable - Bad**	**Unfavourable - unchanged**

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

In view of the recent intensification of agricultural activities throughout the Mullet sand dune sites, and in the absence of a guarantee that future management practices will be sympathetic to the requirements of habitat conservation, the future prospects should be considered *unfavourable-inadequate*.

The overall conservation status assessment of machair is *unfavourable–inadequate*, as the individual elements of the assessment are a combination of *favourable* and *unfavourable-inadequate* ratings.

The most appropriate ranking under the Irish conservation status system is *unfavourable-declining*, considering the trend towards more intensive agriculture that has occurred since the division of open sand plains into small fenced strips.

All of the large dune grassland sites on the Mullet peninsula have seen a major change in management practices in recent times. Previously unenclosed grazing commonages have been

divided up among multiple owners into striped (striped) fields. This has precipitated a general trend towards more intensive agricultural use, which has negatively impacted on the conservation status of habitats. As the status of machair on the Mullet Peninsula has been a topic of some concern to NPWS staff in recent times, an additional element to the present survey, intended to provide a more comprehensive assessment of machair that has been divided into small fenced fields, was carried out.

In addition to the usual monitoring stops regime carried out, individual machair fields were visually assessed as to the habitat quality and the viability of restoring damaged habitat to a more favourable condition. Initially the intention was to assess whether each machair strip was in *favourable* or *unfavourable* condition, and whether or not each unfavourable field was restorable to a more favourable condition, following an appropriate conservation management regime. Those which had been extensively re-seeded and fertilised, or in which a significant proportion of the area was severely damaged, were initially regarded as not restorable. However, following a review of survey results and in consultation with NPWS staff, it was felt that no machair habitat should be regarded as beyond recovery, regardless of the potential difficulties involved in attempting restoration. Nevertheless, the initial restoration assessments retain their usefulness in identifying the more severely damaged fields.

At Leam Lough, this aspect of the survey applied only to the machair mapped in the northern half of the site, as the larger expanse of habitat at the southern end of the site was mostly unenclosed. Mapping points were logged at a corner of each assessed field and these are included as the 'Fields' theme on the site digital map. In general terms, fields in which much of the total area could be expected to produce monitoring stops that pass the overall target criteria were rated as *favourable*, while those in which much of the area would probably produce monitoring stops that fail were deemed *unfavourable*. The typical reasons for unfavourable assessments were low species diversity, dominance of coarse grasses, badly poached or bare soil, and excessive cover of agricultural weed species. The causes of these negative features typically included soil enrichment as a result of fertiliser application, re-seeding of swards, damage from the supplementary feeding of livestock, overgrazing etc.

The eleven narrow fields that comprised the mapped area of machair in the northern half of the site were assessed. All but one was considered to be in *favourable* condition, while the field in

unfavourable condition was - before the subsequent decision to regard all machair fields as restorable - adjudged to be restorable to a favourable condition.

Limitations on the value of this assessment include the fact that the areas of each field, and therefore total areas of habitat in each assessment category, are not considered, nor is that fact that many fields are not uniform in the degree to which they have been modified. Stripes may have been subdivided further by lateral fencing running perpendicular to the long axis of the field, and it was not uncommon for fields with a pattern of hummocks and hollows to show considerable variation throughout in the degree to which the sward had been altered. Low-lying hollows were often of a more improved appearance, while hummocks frequently retained a less fertile sward with greater species diversity and a lower cover of coarse grasses.

Fixed Dunes (H2130)

Habitat extent is rated as *favourable*, as there are no clear indications of a recent human-induced loss of area in the habitat. Fixed dunes form the seaward boundary of the dunes over substantial parts of the site, and the front face of the dunes is often quite steep, indicating significant erosion in the recent past. However, there are no indications that this erosion can be ascribed to causes other than wind and wave action and the depletion of sediment in the system.

Of the 17 monitoring stops carried out in the fixed dunes, 15 passed and two failed the overall criteria which, as a failure rate of 23%, indicates *unfavourable-inadequate* structure and functions. Each of the failed stops had an excessive cover (greater than 5%) of negative indicator species, most notably *Lolium perenne* (Perennial rye-grass), which alone exceeded 5% cover in two of the stops. Also present in one of the failed stops, and also at a lower percentage cover in several other stops, was *Senecio jacobaea* (Common ragwort). Common nettle, *Urtica dioica*, was present in one of the failed stops, while other species indicative of agricultural improvement, although not on the negative indicator species list, included *Dactylis glomerata* (Cock's-foot) and *Poa trivialis* (Rough meadow-grass). The three failed monitoring stops all failed the sward height criteria, while one had less than the minimum number of typical species.

As significant areas of fixed dune have declined in condition over recent years following the restructuring of field boundaries and intensification of agricultural activities, the future prospects for the habitat are rated as *unfavourable-inadequate*. Several negatively impacting activities are

ongoing and likely to lead to further deterioration in habitat quality. Although the widespread loss in the conservation value of sand dune habitats on the Mullet Peninsula in recent years has garnered much attention among the conservation authorities, there are currently no guarantees that any remedial actions or long-term sustainable management plans can be implemented.

Table 125D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Leam Lough

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Machair (21A0)	6	0	**Favourable**
Fixed Dunes (H2130)	15	2	**Unfavourable - Inadequate**
Dune Slack (H2190)	7	0	**Favourable**
Mobile Dunes (H2120)	5	1	**Unfavourable - Inadequate**

A combination of *favourable* and *unfavourable-inadequate* ratings for the individual elements of conservation status assessment indicates an overall *unfavourable-inadequate* assessment.

The assessment thought most appropriate under the corresponding Irish system of conservation status assessment is *unfavourable-unchanged*, as the agricultural 'improvements' that are primarily responsible for the *unfavourable-inadequate* assessments of both structure and functions and future prospects were generally initiated some time before the current reporting period (1996-present).

Dune Slacks (H2190)

There are apparently no previous data relating to dune slack extent with which the present survey results may be compared. In the absence of any indication of a recent loss of habitat, habitat extent is therefore considered *favourable*.

All seven monitoring stops carried out in dune slacks passed the requisite overall criteria, indicating *favourable* structure and functions (Tables 125C&D). Occasionally occurring negative indicator species such as *Lolium perenne* (Perennial rye-grass) and *Senecio jacobaea* (Common ragwort) did not (either singly or together) exceed the maximum limit of 5% cover in any monitoring stop.

Although all monitoring stops passed the overall criteria, there were some indications of overgrazing and a degree of poaching noted in a number of slacks. There was also a presence, albeit below the maximum limit of 5% cover, of negative indicator species – most commonly *Lolium*

perenne (Perennial rye-grass) and *Senecio jacobaea* (Common ragwort) – in a number of monitoring stops. These negative impacts may be attributed to the intensive stock rearing practices that pertain in certain parts of the site. As there is no guarantee that unsustainable management practices will be discontinued, the future prospects for the habitat must be regarded as *unfavourable-inadequate*.

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

The most appropriate Irish conservation status assessment is *unfavourable-unchanged*, as there is little previous information on which to base an assessment, and because there is no evidence of a recent decline in habitat quality.

Mobile Dunes (H2120)

There are no data to suggest a recent consistent decline in the extent of mobile dunes at Leam Lough. However, the habitat is only substantially present in the southern end of the site. Based on this poor habitat zonation and very limited area, habitat extent is rated as *unfavourable-bad*.

Of the six mobile dune monitoring stops carried out, five passed and one failed the overall target criteria - a failure rate of 17% that indicates *unfavourable-inadequate* vegetation structure and functions. An excessive cover of dead or unhealthy *Ammophila arenaria* (Marram) accounted for the single failed stop. All other stops had no negative indicator species, and no more than a minimal cover of unhealthy Marram.

Future prospects for the habitat are considered to be *unfavourable-inadequate*, as this part of the coastline is showing signs of sediment depletion, making any significant accumulation of foredunes unlikely in the near future.

The overall EU conservation status assessment is *unfavourable-bad*, as one of the three individual parameters of conservation status assessment (in this case extent) is rated as *unfavourable-bad*.

The most appropriate Irish conservation status assessment is *unfavourable-unchanged*, as the habitat is of limited extent and restricted distribution, and in places shows signs of a lack of mobility, without any indication of a very recent decline.

Embryonic Dunes (H2110)

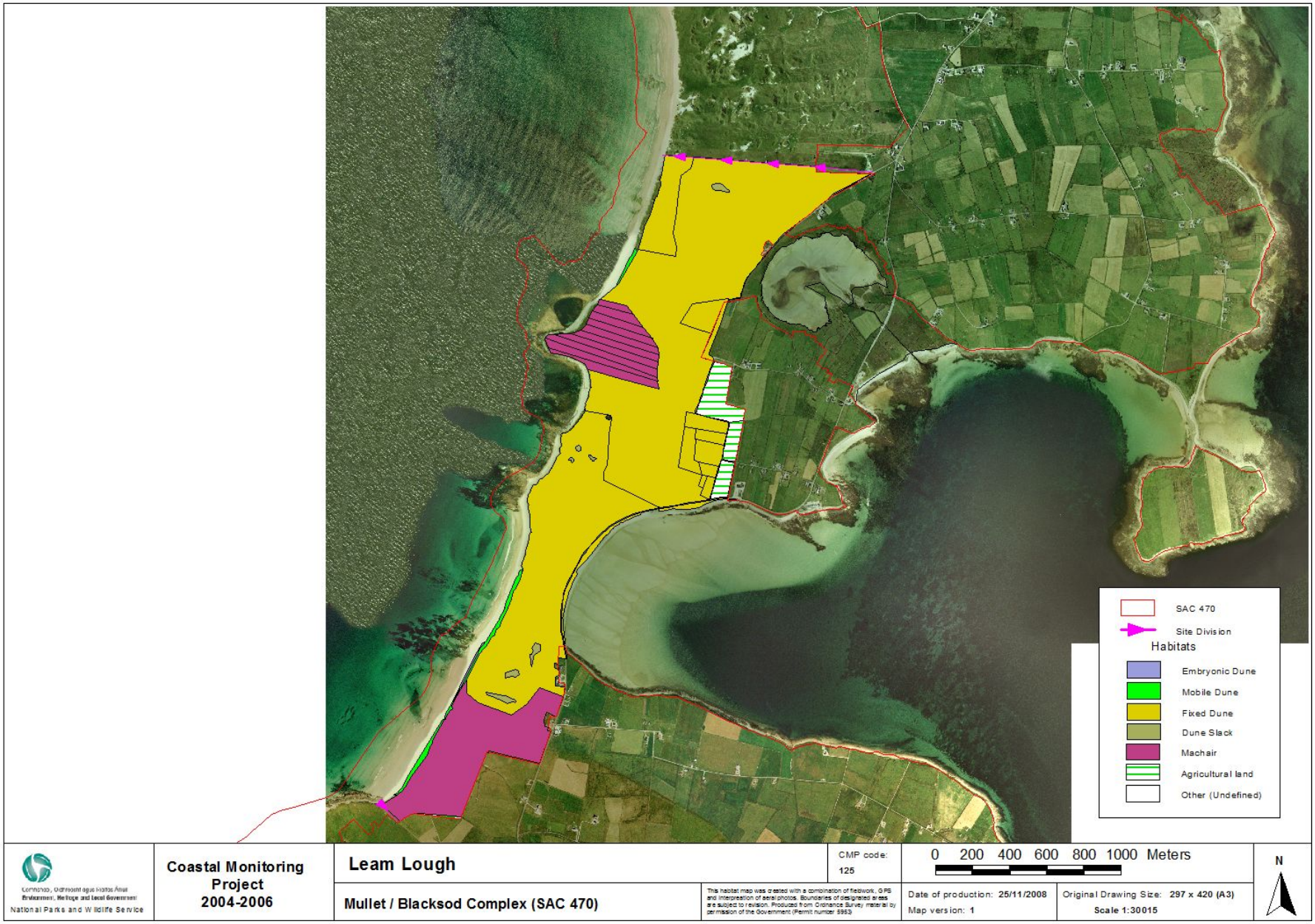
Embryonic dunes at Leam Lough are restricted to a short stretch of habitat in the southern end of the site, situated on the seaward side of the only sizeable mobile dune zone. Although there is no evidence of a very recent decline in extent, the current limited development of foredunes at the site probably reflects the observation by Crawford *et al*. (1996) that the Mullet sand dune sites are showing signs of sediment depletion. For this reason, habitat extent is rated as *unfavourable-bad*.

It was deemed unnecessary to carry out monitoring stops in the very small area of embryonic dunes present. Vegetation structure and functions were therefore assessed visually and rated as *favourable*, due to the reasonably healthy and robust appearance of the dominant species in the habitat.

The future prospects for embryonic dunes are compromised by the fact that the site is believed to be undergoing sediment depletion. It therefore seems unlikely that a substantial or widely distributed band of foredunes will form in the near future. Sand extraction activities are also known to take place at the Mullet sand dune sites, and may exacerbate erosion in foredune habitats. For these reasons, the future prospects are rated *unfavourable-inadequate*.

The overall EU conservation status assessment is *unfavourable-bad*, as one of the three individual parameters of conservation status assessment (in this case habitat extent) is rated as *unfavourable-bad*.

The most appropriate Irish conservation status assessment is thought to be *unfavourable-unchanged*, as the current limited extent and poor zonation of the habitat is likely to reflect its condition over the entire period on which the current assessments are based (1996-present).



Coastal Monitoring Project 2004-2006

Leam Lough

Mullet / Blacksod Complex (SAC 470)

CMP code: 125

This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated areas are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 5953)

Date of production: 25/11/2008
Map version: 1

Original Drawing Size: 297 x 420 (A3)
Scale 1:30015

National Parks and Wildlife Service

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

SITE DETAILS

CMP06 site name: **Cross lough** CMP06 site code: **126** CMP Map No.: **123**

CMP06 subsite name: **Belderra Strand** CMP06 site code: **203**

County: **Mayo** Discovery map: **22** Grid Reference: **F 635 305**

6 inch Map No.: **Ma 16**

Aerial photographs (2000 series): **O1046C, O1105 B&D, O1106A,B,D, O1167A,B**

NPWS Site Name: **Mullet / Blacksod Complex**

NPWS designation: pNHA: **470** cSAC: **470** SPA: **4055**

Ranger Area: **Mayo**

MPSU Plan**: Draft II – Consultation (2001)**

Report Author: **Anne Murray**

SITE DESCRIPTION

Cross Lough is part of the larger coastal site and designated cSAC – Mullet/Blacksod Complex, located in north-west Mayo. The cSAC comprises much of the Mullet peninsula, the sheltered waters of Blacksod Bay and the low-lying sandy coastline from Belmullet to Kinrovar. Cross Lough is located south of Belmullet and the site extends from Belderra Strand north of Cross Lough to Lurgacloy in the south.

The EU Annex I sand dune and machair habitats for which this cSAC was selected include the following: Mobile dunes and the priority habitats - Decalcified dunes with *Empetrum nigrum*, Machair and Fixed dunes. Other EU Annex I habitats for which the site is designated are – *Salicornia* and other annuals colonising mud and sand, Mudflats and sandflats not covered by seawater at low tide, Reefs and Large shallow inlets and bays.

The EU Annex I habitats recorded at Cross Lough during this survey include, the priority habitats – Machair and Fixed dune as well as Dune slack, Mobile dunes and Embryonic dunes. All of the machair and fixed dune at Cross Lough has been fenced into strips (with the exception of some fixed dune fringing the coastal edge) and intensively managed as individual units. The striped fencing runs perpendicular to the coast and grazing is mainly by cattle and horses.

Table 126A Areas of EU Annex I sand dune and machair habitats mapped at Cross lough

EU Code	EU Habitat	Area (ha)
H2110	Embryonic shifting dunes	0.053
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	2.606
H2130	Fixed coastal dunes with herbaceous vegetation	186.753
H2190	Humid Dune Slacks	0.255
H21A0	Machair (Belderra Strand)	15.407
H21A0	Machair (Cross Lough west)	60.729
	Total Sand dune	**265.803**

The traditional seasonal grazing regime has changed and the livestock are now present on the site all year round (MPSU, 2001). Supplementary feeding of livestock is common in these striped fields. The establishment of an equestrian centre immediately northwest of Cross Lough has modified the fixed dunes there. The structure of the fixed dunes has been altered, the typical species have been replaced with *Lolium perenne* (Perennial rye-grass) due to reseeding and a horse track and animal housing have been installed. The total machair and sand dune habitat at Cross Lough is 266ha (Table 126A).

Machair (H21A0)

Machair habitat was noted for this part of the cSAC in the NATURA 2000 form and the Biomar Survey of Irish Machair Sites (Crawford *et al.*, 1996). Machair was identified during this survey along the western edge of Cross Lough and a small area of machair north of the loch at Belderra Strand (15ha). The machair at Belderra Strand is treated as a separate subsite in this project (CMP 203), site I.D. 242 in the database. These areas are highly representative of machair in terms of flora and topography. This is based on visual assessment of a) the presence of sandy substrate, b) species composition and c) flat/level topography. All of the machair is strip fenced and improved to some extent. Each field was assessed visually during the site visit to estimate the percentage of machair that has been heavily impacted by agricultural activities, most notably by improvement and overstocking. Approximately 25% of the striped machair at Cross Lough is in an unfavourable condition. However, in consultation with NPWS research staff it was agreed that all machair fields in the cSAC are restorable. There is fixed dune habitat to the north and south of the machair. A shingle storm beach edges the machair for most of its length. The machair habitat at Cross Lough comprises 76ha (Table 126A).

The typical species of machair recorded at Cross Lough 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), *Leontadon saxatilis*

(Lesser hawkbit), *Lotus corniculatus* (Bird's foot trefoil), *Luzula campestris* (Wood-rush), *Plantago lanceolata* (Ribwort plantain), *Trifolium repens* (White clover) and *Thymus polytrichus* (Wild thyme). Other species present include *Anthoxanthum odoratum* (Sweet vernal-grass), *Anthyllis vulneraria* (Kidney vetch), *Carex flacca* (Glaucous sedge), *Festuca rubra* (Red fescue), *Hypochaeris radicata* (Cat's ear), *Ranunculus bulbosus* (Bulbous buttercup), *Rumex acetosella* (Sheep's sorrel) and mosses- *Homalothecium lutescens*, *Rhytidiadelphus squarrosus* and *Eurhynchium* spp.

There are some small areas of wet machair with typical species: *Anagallis tenella* (Bog pimpernel), *Carex flacca* (Glaucous sedge), *Carex nigra* (Common sedge), *Hydrocotyle vulgaris* (Marsh pennywort), *Prunella vulgaris* (Selfheal) and *Calliergonella cuspidata.*

The negative indicator species *Senecio jacobaea* (Common ragwort), *Cirsium arvense* (Creeping thistle), *Urtica diocia* (Nettle), *Lolium perenne* (Perennial rye-grass) and *Cynosurus cristatus* (Crested dog's-tail) are common throughout the machair due to the intensive agricultural use of the striped fields.

Fixed Dunes (H2130)

The fixed dunes occur to the north of Cross Lough at Corraun Point and in the south of the site at Drum, from where the dunes continue south along the edge of Leam Lough as far as Elly Bay. Both sand dune systems are striped and managed for agriculture. Cattle are the main grazers along with rabbits and horses to a lesser extent. Supplementary feeding is evident in most fields. A wide cobble ridge extends the length of the seaward edge of the fixed dunes and machair. This storm beach is unvegetated. The fixed dune habitat comprises 187ha (Table 126A).

The fixed dunes species diversity is high with plenty of the typical species including: *Anthyllis vulneraria* (Kidney vetch), *Carex arenaria* (Sand sedge), *Carex arenaria* (Sand sedge), *Carex flacca* (Glaucous sedge), *Cerastium fontanum* (Common mouse-ear), *Daucus carota (*Wild carrot*)*, *Festuca rubra* (Red fescue), *Euphrasia officinalis* agg. (Eyebright), *Galium verum* (Lady's bedstraw), *Hypochaeris radicata* (Cat's ear), *Lotus corniculatus* (Common bird's-foot-trefoil), *Luzula campestris* (Wood-rush), *Plantago lanceolata* (Ribwort plantain), *Polygala vulgaris* (Common milkwort), *Rhinanthus minor* (Yellow rattle), *Taraxacum* agg. (Dandelion), *Thymus polytrichus* (Wild thyme), *Trifolium repens* (White clover), *Trifolium pratense* (Red clover), Veronica chamaedrys (Germander speedwell), *Viola tricolor* ssp. *curtsii* (Wild pansy), lichens -

Peltigera spp., and mosses -*Calliergonella cuspidata*, *Rhytidiadelphus triquestrus* and *Rhytidiadelphus squarrosus*.

Other species present in the fixed dune are: *Ammophila arenaria* (Marram grass), *Arabis hirsuta* (Hairy rock-cress), *Bellis perennis* (Daisy), *Geranium molle* (Doves's-foot crane's-bill), *Leucanthemum vulgare* (Oxeye daisy), *Poa annua* (Annual meadow-grass), *Ranunculus bulbosus* (Bulbous buttercup), *Ranunculus repens* (Creeping buttercup) *Rumex acetosella* (Sheep's sorrel), and *Stellaria media* (Common chickweed).

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)**

The area of dune slack comprises 0.25ha of the total sand dune habitat (Table 126A). There is one wet dune slack in the fixed dunes south of Cross Lough. The slack is well grazed by cattle and this keeps the sward short and helps to maintain the diversity of species and openness of the slack.

The typical species that occur in the slack are *Carex nigra* (Common sedge), *Hydrocotyle vulgaris* (Marsh pennywort), *Mentha aquatica* (Water mint), *Potentilla anserina* (Silverweed) and *Prunella vulgaris* (Selfheal).

Other species include: *Anthoxanthum odoratum* (Sweet vernal-grass), *Cerastium fontanum* (Common mouse-ear), *Daucus carota (*Wild carrot*)*, *Holcus lanatus* (Yorkshire-fog), *Lotus corniculatus* (Bird's foot trefoil), *Ranunculus repens* (Creeping buttercup), *Rhinanthus minor* (Yellow rattle), *Trifolium repens* (White clover), *Trifolium pratense* (Red clover) and the moss - *Rhytidiadelphus triquestrus.*

The negative indicator species *Senecio jacobaea* (Common ragwort) occurs in the dune slack. The wet and soft ground of the slack is very susceptible to poaching by cattle.

- **Mobile Dunes (H2120)**

The total mobile dune area is 2.6ha (Table 126A). The mobile dunes front the fixed dunes north of Corraun Point. The front slope of the mobile dunes is naturally eroding to the north. The recent alterations to the sand dune habitat to establish the equestrian centre have also affected the mobile

habitat and newly installed fencing extends into the mobile habitat. A cobble beach fronts the mobile dunes.

The typical species *Ammophila arenaria* (Marram grass) dominates with other species present - *Elytrigia juncea* (Sand couch) and *Eryngium maritimum* (Sea-Holly).

The negative indicator species *Cirsium arvense* (Creeping thistle) occurs in the mobile dunes but is not common.

- **Embryonic Dunes (H2110)**

A patch of embryonic dune occurs at the tip at Corraun Point. However this is a very small area of 0.05ha, with no clear zonation developing. The typical species *Elytrigia juncea* (Sand couch) dominates with *Eryngium maritimum* (Sea-Holly) also present. There are no negative indicator species present in this area.

IMPACTS

The main activities impacting the machair and sand dunes at Cross Lough are given in Table 126B. The impacts here are similar to those at the other main sites of the cSAC of the Mullet Peninsula. All of the machair and sand dune system have been strip fenced (code 150). With the exception of the mobile dunes that lie outside of the striped fields, the sand dune area and machair are affected by grazing (code 140). The impact of grazing has been generally positive throughout the dunes and machair resulting, in high species diversity and preventing rank vegetation and scrub from becoming dominant. There are some areas that have been overgrazed (code 143) and affected by associated activities such as erosion and invasion of agricultural weeds due to poaching (code 720) and dunging by cattle. Some blowouts are covered in old silage and manure in an effort to stabilise the bare sand; this has also encouraged the introduction of agricultural weeds.

Some of the machair is used for hay/silage production and both the machair and fixed dune habitat have been improved to some extent (code 103) including the fields recently established as an equestrian centre to the north of Cross Lough. The fixed dunes structure has been altered, topsoil brought in and the fields reseeded with *Lolium perenne* (Perennial rye-grass).

Table 126B Intensity and impact of various activities on sand dune habitats at Cross Lough

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H2130	103	B	-1	40	Inside
H2190	103	C	-1	0.01	Inside
H21A0	103	B	-1	20	Inside
H2130	140	B	+1	100	Inside
H2190	140	B	+1	0.2	Inside
H21A0	140	B	+1	50	Inside
H2130	143	B	-1	40	Inside
H21A0	143	B	-1	30	Inside
H2130	150	A	-1	185	Inside
H2190	150	A	-1	0.2	Inside
H21A0	150	A	-1	75	Inside
H2130	171	B	-1	10	Inside
H2190	171	B	-1	0.01	Inside
H21A0	171	B	-1	10	Inside
H2130	430	C	-2	4	Inside
H21A0	430	C	-2	4	Inside
H2130	623	B	-1	6	Inside
H21A0	623	B	-1	6	Inside
H2130	720	B	-1	20	Inside
H21A0	720	B	-1	20	Inside
H2120	900	C	0	Unknown	Inside
H2130	900	C	0	Unknown	Inside
H21A0	900	C	0	Unknown	Inside

[1]EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.
[2] Description of activity codes are found in Appendix 3
[3] Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.
[4] Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence
[5] Location of activity: Inside = activities recorded within 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 strip fencing has encouraged more intensive agricultural management of each strip resulting in, an increase in the provision of permanent shelters (code 430) and ring feeders (code 171) on the site and increase in the concentration of livestock in each field. The numerous tracks throughout the site indicate the use of agricultural machinery in the fields (code 623). These activities cause the ground to become compacted and contribute to the damage of the fields, especially near access points.

There is evidence of natural erosion (code 900) along the seaward edge of the machair and sand dunes caused by winter storms. This natural erosion is compounded in places by agricultural activities described above.

The small wet dune slack is grazed and the positive impacts of grazing could also be detected in the high diversity of plant species and the lack of scrub invasion.

The mobile dunes that run along the western edge of the fixed dunes lie outside of the striped fields and so they are largely unaffected by agricultural activities. The main impact on this habitat is natural erosion (code 900).

- **CONSERVATION STATUS**

The conservation status of a site is assessed on the condition of the site and on baseline information. For the purpose of this project the cSAC is divided into eight main sites for sand dune and machair. These are Dooyork (Site 119), Doolough (Site 120), Sra South (Site 121), Sra North (Site 122), Aghleam (Site 124), Leam Lough (Site 125), Cross Lough (Site 126) and Termoncarragh (Site 127) and these are dealt with in separate reports within this project. The main source of baseline information for this site is the NATURA 2000 survey and the Biomar Survey of Irish Machair Sites (Crawford *et al*., 1996).

The method of assessment of conservation status differed in the NATURA 2000 survey and so direct comparisons between the conservation status of the two surveys were not possible. In relation to machair habitat, comparisons can be made with the Biomar machair survey 1996 mainly in relation to structure and functions of machair and its condition. There is no delineation of machair in the 1996 Machair study as the NVC habitat classification was used to describe the machair system. As machair is not defined by a particular plant community it was not possible to discern the boundaries between machair and other sand dune plant communities from the 1996 maps. Therefore, best scientific judgement is used along with any of the broader comparisons made with previous surveys. The conservation status of the Annex I sand dune habitats in Cross Lough are given in Table 126C.

Machair (H21A0)

Belderra Strand (West)

The extent of machair is rated as *favourable* (Table 126C). This assessment is based on best scientific judgement as the cSAC maps and NATURA survey do not indicate machair at this part of Cross Lough. This part of the site is not described completely, in terms of extent in the 1996 Machair Survey. The area is not striped fenced and there is no apparent activity currently affecting its extent.

Table 126C Conservation status of Annex I sand dune habitats at Cross Lough

Habitat[1]	EU Conservation Status Assessment				
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**	**Overall EU conservation status assessment**	**Proposed Irish conservation status system[2]**
Machair (21A0) *Belderra Strand (West)*	Extent	Future prospects	Structure & Functions	Unfavourable - bad	Unfavourable-declining
Machair (21A0) *Cross Lough (West)*	Extent/ Structure and functions	Future prospects		Unfavourable - Inadequate	Unfavourable-declining
Fixed Dunes (H2130)		Extent/ Structure and functions/ Future prospects		Unfavourable - Inadequate	Unfavourable-declining
Atlantic decalcified fixed dune (Calluno-Ulicetea) (H2150)	Extent/ Structure and functions/ Future prospects			Favourable	Favourable-maintained
Dunes with *Salix repens* (H2170)	Extent/ Structure and functions	Future prospects		Unfavourable - Inadequate	Unfavourable-declining
Dune Slack (H2190)	Extent/ Structure and functions	Future prospects		Unfavourable - Inadequate	Unfavourable-declining
Mobile Dunes (H2120)	Structure and functions	Extent/ Future prospects		Unfavourable-inadequate	Unfavourable-unchanged

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

The structure and functions parameter is rated as *unfavourable-bad*. Four monitoring stops were placed in the machair area and two of these failed (Table 126D). This machair is grazed by cattle and has a poor diversity of species as well as a high percentage cover of agricultural weeds and grasses, including - *Lolium perenne* (Perennial rye-grass), *Urtica dioica* (Common nettle) and *Senecio jacobaea* (Common ragwort).

The future prospects for this site are considered *unfavourable-inadequate* on the basis that the machair is improved and it is likely that this will impact negatively on the machair habitat in the longterm.

The conservation status of the machair within the entire cSAC is described as *average or reduced conservation* in the NATURA 2000 survey. This part of the site is heavily improved. Therefore, the overall EU conservation status of the machair is considered *unfavourable-bad* (Table 126C).

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

Cross Lough (West)

The extent of machair is rated as *favourable* (Table 126C). This assessment is based on comparisons between the previous studies of extent of Cross Lough - cSAC maps and the 1996 Machair Survey – and the current extent. There is no decline in extent of the machair.

The structure and functions parameter is rated as *unfavourable-inadequate*. Eight monitoring stops were placed in the machair area and one of these failed (Table 126D). The machair fields are tightly grazed mainly by cattle and are overgrazed in places. There is a limited diversity of species and a high percentage cover of agricultural weeds and grasses, including - *Lolium perenne* (Perennial rye-grass), *Urtica dioica* (Common nettle) and *Senecio jacobaea* (Common ragwort). This is also reflected in the visual assessment of each machair field as approximately 25% of the striped machair at Cross Lough is in an unfavourable condition.

The future prospects for this site are considered *unfavourable-inadequate* on the basis that the machair is improved with reduced typical machair species and it is likely that this will continue to impact negatively on the machair habitat. Although, the machair at this site is considered restorable the viability of the habitat is under threat as there it is currently no plan in place to change the management of the machair, most of which is now under the REPS scheme. Local NPWS staff has suggested the establishment of a LIFE project for the Bellmullet peninsula in order to try to alter the agricultural management of the site.

The conservation status of the machair within the entire cSAC is described as *average or reduced conservation* in the NATURA 2000 survey. This part of the site is heavily improved. Therefore, the overall EU conservation status of the machair is considered *unfavourable-inadequate* (Table 126C).

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

Fixed Dunes (H2130)

There are two areas of fixed dunes within the Cross Lough site. These areas are under similar agricultural management and are assessed jointly.

The extent of fixed dunes is rated as *unfavourable-inadequate* (Table 126C). The establishment of an equestrian centre on the fixed dunes has led to the modification of the dunes and therefore reduced the extent. Natural erosion is also evident along the edge of the fixed dunes in places however, this is not considered unfavourable.

The structure and functions parameter is rated as *unfavourable-inadequate*. A total of sixteen monitoring stops were placed in the fixed dunes and two of these failed (Table 126D). The two stops that failed were located in the north-western part of the site on the landward side of the fixed dunes.

Table 124D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Cross Lough

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Machair (H21A0) ***Belderra Strand (West)***	2	2	**Unfavourable-bad**
Machair (H21A0) ***Cross Lough (West)***	7	1	**Unfavourable-inadequate**
Fixed Dunes (H2130)	14	2	**Unfavourable-inadequate**
Dune Slack (H2190)	1	0	**Favourable**
Mobile Dunes (H2120)	4	0	**Favourable**

The decline in fixed dune habitat is a result of erosion by overstocking of cattle that graze the dunes (hares and rabbits also graze the fixed dunes). This is attributable to the strip fencing. Some fields are overgrazed and affected by associated activities such as erosion and invasion of agricultural weeds due to poaching and dunging by cattle.

The future prospects for the fixed dunes are considered *unfavourable-inadequate* on the basis that the striped fencing will cause further decline of the fixed habitat in the future.

The conservation status of the fixed dunes at the entire cSAC is described as *good conservation* in the NATURA 2000 survey. Currently, the overall EU conservation status of fixed dune is *unfavourable-inadequate* (Table 126C). This rating is attributable to the intensification of agricultural activities due to strip fencing and the presence of an equestrian centre.

The Irish conservation status is rated as *unfavourable-declining*. This rating is attributable to the intensification of agricultural activities due to strip fencing and the presence of an equestrian centre.

Dune Slack (H2190)

There is one very small dune slack at Cross Lough. The extent is rated as *favourable* as there is no apparent decline in the area of dune slack. This is based on best scientific judgement.

The structure and functions parameter is rated as *favourable*. Due to the small area of dune slack at the site, one monitoring stop was placed in this habitat and this passed (Table 126D). The negative indicator *Senecio jacobaea* (Common ragwort) occurred in the slack but was rare.

The future prospects of this habitat are considered *favourable.* It is located in the less intensively managed part of the fixed dune south of Cross Lough.

The conservation status of the dune slack is not assessed in the NATURA 2000 survey. Currently, the overall EU conservation status of dune slack is *favourable* (Table 126C) as although the slack is small it contains a good diversity of species and is not currently under threat from agricultural activities.

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

Mobile Dunes (H2120)

The extent of the mobile dunes is rated as *unfavourable-inadequate* at Cross Lough (Table 126C). The mobile dunes are undergoing natural erosion, a process that is not considered as unfavourable in relation to extent of habitat. However, the mobile dunes have been altered at the equestrian centre where the fencing extends into the mobile dunes.

The structure and functions parameter is rated as *favourable*. A total of 4 monitoring stops were placed in the mobile dunes at Cross Lough and all four passed (Table 126D).

The future prospects of this habitat are considered *unfavourable-inadequate*. The development of an equestrian centre and the associated activities is likely to impact on the mobile dunes.

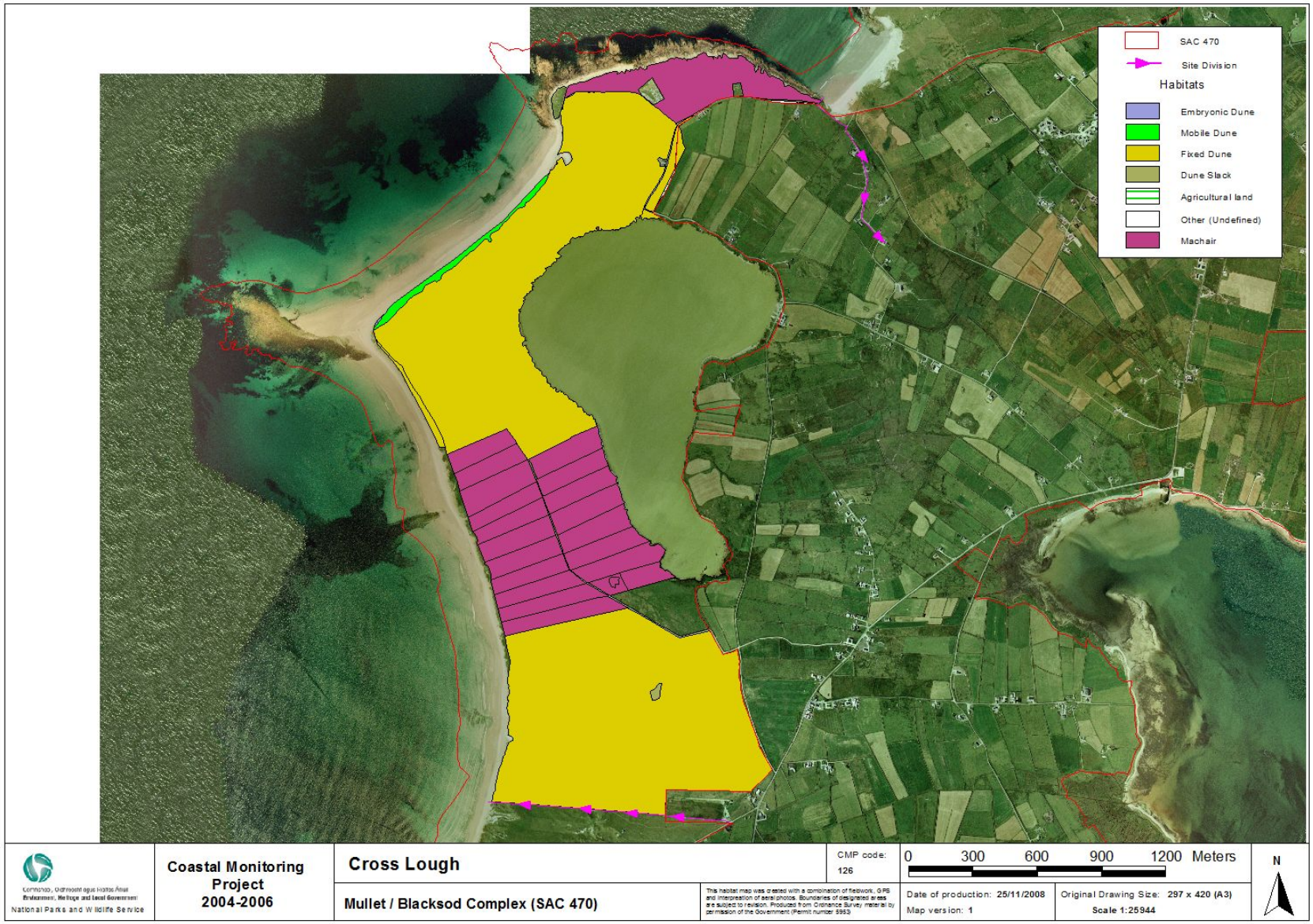
The conservation status of the mobile dunes was described as *good* in the NATURA 2000 survey. Currently, the overall EU conservation status of mobile dunes at Cross Lough is *unfavourable-inadequate* (Table 126C). This rating is attributable to the negative impacts of the equestrian centre on this habitat.

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

Embryonic Dunes (H2110)

This habitat is not assessed in the NATURA 2000 form. The habitat is not delineated on the maps associated with the NATURA report nor is the habitat defined on the maps of the management plan.

There is only a fragmented patch of embryonic dune located at Corraun Point north of Cross Lough. There is no conservation status assessment for this habitat as it is of very limited extent at the site.


SAC 470
Site Division
Habitats
Embryonic Dune
Mobile Dune
Fixed Dune
Dune Slack
Agricultural land
Other (Undefined)
Machair
Coastal Monitoring Project 2004-2006
Cross Lough
Mullet / Blacksod Complex (SAC 470)
CMP code: 126
0 300 600 900 1200 Meters
N
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:25944
National Parks and Wildlife Service

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

SITE DETAILS

CMP06 site name: **Termoncarragh Lough** CMP06 site code: **127**

CMP Map No.: **124**

County: **Mayo** Discovery map: **22** Grid Reference: **F 650 345**

6 inch Map No.: **Ma 9**

Aerial photographs (2000 series): **O0987-A,B,C,D; O1046-A,B,C,D; O1047-C; O1106-A, B**

NPWS Site Name: **Mullet / Blacksod Complex**

NPWS designation: pNHA: **470** cSAC: **470** SPA: **4093**

Ranger Area: **Mayo**

MPSU Plan**: Draft II – Consultation (2001)**

Report Author: **Kieran Connolly**

SITE DESCRIPTION

Termoncarragh Lough is the most northerly of four large sand dune sites on the western side of the Mullet Peninsula in northwest Mayo. To the south of Termoncarragh are Cross Lough (site 126 in the present report), Leam Lough (125) and Aghleam (site 124), and these, together with Doo Lough, Dooyork, Srah North and Srah South, on the eastern side of Blacksod Bay, comprise the significant sand dune sites in the Mullet/Blacksod Complex cSAC. Termoncarragh, which extends over more than 5km of coastline, is contiguous with Cross Lough (site 126) to the south. The boundary between the two sites, arbitrarily chosen as the south end of Belderra Strand for the purposes of this project, is included as a theme on the site digital map.

The entire Mullet/Blacksod Complex cSAC comprises much of the Mullet Peninsula, the sheltered waters of Blacksod Bay and some sandy coastline on the eastern side of Blacksod Bay. Much of the total cSAC area – an estimated 60% in the NATURA 2000 standard data form – is accounted for by marine areas and sea inlets, while the machair and sand dune component (including sand beaches) is estimated as 16% of the total area. The other habitat class that represents a significant proportion of the total area is that which encompasses tidal rivers, estuaries, mud flats, sand flats and Lagoons.

The Mullet/Blacksod site was proposed for designation as a cSAC due to the presence of Machair, Fixed dunes, and Decalcified fixed dunes with *Empetrum nigrum* – all priority Annex I habitats in the EU Habitats Directive. However, although machair and fixed dunes comprise a significant proportion of the sand dune habitats (including at Termoncarragh) the status of Decalcified fixed dunes with *Empetrum nigrum* is less clear. A tract of this habitat to the southwest of Termoncarragh Lough was apparently previously known, but was not seen during the present survey, or in other recent surveys. Explanatory notes accompanying the NATURA 2000 standard data form, and correspondence between NPWS staff (contained in the site files), suggest that the habitat may have been overgrazed and damaged to such an extent that the site should be de-listed for the habitat. However, a small area of dune heath, referable to the Annex I habitat 'Atlantic Decalcified fixed dune (Calluno-Ulicetea)', which has apparently been overlooked before, was found in a mosaic composition with machair in the southwest corner of the site during the present survey. .

In addition to the sizeable machair and fixed dune areas, and the apparently previously unmapped dune heath, the other Annex I sand dune habitats mapped at Termoncarragh were Annual vegetation of driftlines, Perennial vegetation of stony banks, Embryonic shifting dunes, Shifting dunes along the shoreline with *Ammophila arenaria* and Humid Dune Slacks (Table 126A).

Table 127A Areas of EU Annex I habitats mapped at Termoncarragh Lough

EU Code	EU Habitat	Area (ha)
H1210	Annual vegetation of driftlines	0.031
H1220	Perennial vegetation of stony banks	0.424
H2110	Embryonic shifting dunes	1.305
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	2.577
H2130	Fixed coastal dunes with herbaceous vegetation	230.596
H2150	Atlantic Decalcified fixed dune (Calluno-Ulicetea)	6.204
H2190	Humid Dune Slacks	0.659
H21A0	Machair	222.755
	Total Sand dune	**464.551**

The Mullet Peninsula contains some of the larger and most significant machair and fixed dunes in the country, and Termoncarragh Lough is dominated by considerable expanses of these two habitats. Machair to the west of Termoncarragh lake has previously been regarded as among the best developed on the Peninsula, while a further significant expanse is also found around Emlycass, to the north of Carne golf club. A smaller area of machair, including some in a mosaic composition with dune heath, was mapped in the southwest corner of the site.

Fixed dunes are found throughout Termoncarragh, most notably to the southwest of Annagh Marsh. Carne golf course, which opened in 1992, encompasses a large area of natural fixed dune, which is now greatly modified and entirely excluded from the cSAC, while further fixed dune habitat is found in Emlybegs, to the south of the golf course. The total area of golf course property was reported as 96.8ha (Gaynor & Browne, 1999), although 'amenity grassland' polygons drawn over the golf course and adjacent highly modified habitat on the site digital map accompanying this report amount in total to 114.044ha. Although the golf course still has an impressive topography of high dunes and has retained much of its ecological value, its exclusion from the cSAC and the interruption to the natural functioning of a dune system that golf course management represents, means that the entire area may be considered as lost sand dune habitat.

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In recent years, consideration of the conservation value of the Mullet Peninsula sand dunes has been dominated by the restructuring of agricultural holdings, which has greatly influenced land management regimes. Large areas of Termoncarragh, and the other Mullet Peninsula sites, formerly consisted of open commonages, but the sub-division of these areas into small, fenced fields in the 1980's, which allowed shareholders to assume control of their own individual areas has led to more intensive agricultural practices. Chief among these are overgrazing, supplementary feeding, fertiliser application and re-seeding of swards. As a result, the conservation value of sand dune habitats has greatly declined, with erosion, the replacement of species-rich turf with species-poor swards dominated by agricultural grasses, and the spread of nitrophilous weed species among the more obvious consequences.

The sand dunes on the eastern side of Blacksod Bay have not been so affected, with the result that the machair habitats found there have probably increased in relative importance and conservation value.

In addition to the conservation interest attached to the presence of several Annex I habitats, Termoncarragh Lough and the other Mullet Peninsula sites are of interest for a variety of reasons. Included in the NATURA 2000 network are the three Special Protection Area's (SPA's) of Cross Lough, Termoncarragh Lake and Blacksod Bay/Broadhaven, the combined area of which holds internationally important numbers of Whooper swan, Barnacle Goose, Great Northern Diver and Light-Bellied Brent Goose, as well as nationally important numbers of several other species.

Eighteen migratory or breeding species listed under Annex I of the EU Birds Directive are known from the site, including species such as Corncrake, Golden Plover, Greenland White-fronted Goose, Red-necked Phalarope and Ruff. Termoncarragh SPA was designated due to the presence of Barnacle geese and Red-necked Phalarope. BirdWatch Ireland maintains bird reserves at Termoncarragh Lough and Annagh Marsh.

Mammal species known from the cSAC that are listed under Annex II of the EU Habitats Directive include Otter (*Lutra lutra*), Common Seal (*Phoca vitulina vitulina*) and Grey Seal (*Halichoerus grypus*).

A number of rare invertebrates are known from the site, including two recently recorded species. The Great Yellow Bumble Bee (*Bombus distinguendos*) and Belted Beauty Moth (*Lycia zonaria britannica*) - have recently been seen at Termoncarragh (D. Suddaby, pers. comm.). Several Hares (*Lepus timidus hibernicus*) were seen on the striped machair fields north of Termoncarragh Lake on one of the site visits, while the Garden chafer beetle (*Phyllopertha horticola*) was notably common.

Machair (H21A0)

Machair at Termoncarragh consists of several large, discrete areas of habitat, scattered throughout the full length of the site. Northwest of Annagh marsh is an extensive area of small striped fields, fenced roughly parallel to the shore. The intensification of agricultural activities that has followed the division of unenclosed commonage grazing land into individually owned small fields can be seen most clearly here. Overgrazing, supplementary feeding, reseeding of swards and fertiliser application are among the activities that have led to a deterioration in habitat quality.

To the west of Annagh marsh lies a more open area of machair that has not suffered the same degree of damage as that seen in other parts of the site. Plant species diversity is quite high throughout much of the area and overgrazing is generally not a major problem, although the more northerly reaches of this machair zone are somewhat less intact and have suffered some damage through the presence of ring feeders.

At the west edge of this machair area, there is some saltmarsh vegetation around the edges of a channel that leads to the adjacent strand. The channel was dry during the site visit, but is clearly penetrated by the tide. Some of the species noted were *Glaux maritima* (Sea-milkwort), *Plantago*

maritima (Sea plantain) and *Triglochin maritimum* (Sea arrowgrass). The area in question was not sufficiently large to warrant mapping on the site digital map.

North of the golf course, there is a wide band of machair extending back from the shoreline, across the full width of the cSAC boundaries - a distance of approximately 1.4km. The grassland here has also been fenced into strips, although the field sizes are often greater than those to the northwest of Termoncarragh Lake. The fields have also been modified to varying degrees by individual management regimes and much of the area is as badly damaged as those fields further north.

Despite the intensive management regimes that have adversely affected the habitat at Termoncarragh, there are some remaining areas with a typical machair flora. Among the more commonly occurring species were *Bellis perennis* (Daisy), *Euphrasia officinalis* agg. (Eyebright), *Carex arenaria* (Sand sedge), *Cerastium fontanum* (Common mouse-ear), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Common Bird's-foot trefoil), *Plantago lanceolata* (Ribwort plantain), *Prunella vulgaris* (Selfheal), *Rhytidiadelphus squarrosus*, *R. triquetrus*, *Scleropodium purum*, *Thymus polytrichus* (Wild thyme) and *Trifolium repens* (White clover). Species noted in wet machair areas included *Calliergonella cuspidata*, *Carex flacca* (Glaucous sedge), *C. nigra* (Common sedge), *Hydrocotyle vulgaris* (Marsh pennywort), *Mentha aquatica* (Water mint), *Ranunculus flammula* (Lesser spearwort) and *Ranunculus repens* (Creeping buttercup). In addition to the noteworthy elements of machair flora that remain, the habitat also forms interesting transitions with a number of associated habitats, such as fen and dune heath.

In addition to the monitoring stops that were used to assess vegetation structure and functions, each striped machair field was visually assessed and rated as *favourable* or *unfavourable*, according to the integrity of vegetation structure and function attributes, and the degree of damage that had taken place. Mapping points were logged at a corner of each assessed field and these are included as the 'Fields' theme on the site digital map. In general terms, fields in which much of the total area could be expected to produce monitoring stops that pass the overall target criteria were rated as *favourable*, while those in which much of the area would probably produce monitoring stops that fail were deemed *unfavourable*. The typical reasons for unfavourable assessments were low species diversity, dominance of coarse grasses, badly poached or bare soil, and excessive cover of agricultural weed species.

The feasibility of restoring each unfavourable field to a more favourable condition, following an appropriate conservation management regime, was also assessed. Those which had been extensively re-seeded and fertilised, or in which a significant proportion of the area was severely damaged, were initially regarded as not restorable. However, following further site visits and in consultation with NPWS staff, it was felt that no machair field should be regarded as beyond recovery, regardless of the potential difficulties involved in attempting restoration. Nevertheless, the initial restoration assessments retain their usefulness in identifying the more severely damaged fields.

Thirty fields were assessed on either side of the cemetery in the area west of Termoncarragh Lake. Four fields mapped as fixed dunes were included in this number, as they are contiguous with, and under similar management to the adjacent machair. Of the 26 machair fields, 19 were thought to be in *unfavourable* condition, while seven were adjudged *favourable*. Some fields that were adjudged to be *favourable* had small, localised patches of weeds, such as *Urtica dioica* (Common nettle), or areas damaged by the siting of ring feeders in parts of the field. However, in these cases the greater proportion of the vegetation had retained at least a minimum standard of structural and functional integrity. Of the 19 *unfavourable* fields, 15 were considered – before the subsequent decision to regard all machair fields as restorable – as being beyond a reasonable possibility of recovery, indicating their particularly poor condition. The more severely damaged fields typically exhibited some or all of the main factors associated with intensive agricultural management, including the siting of ring feeders and troughs, soil poaching or erosion, and a dominance of agricultural grasses - most commonly *Lolium perenne* (Perennial rye-grass). The more common weed species – occurring either in localised clumps or more sparsely spread over wider areas, were *Arctium* sp. (Burdock), *Cirsium arvense* (Creeping thistle), *C. vulgare* (Spear thistle), *Rumex crispus* (Curled dock) and *Urtica dioica* (Common nettle).

Five other machair fields in the southwest corner of the site were similarly assessed, and of these, four were thought to be in *favourable* condition. Only one was thought *unfavourable*, and it was in sufficiently poor condition to be adjudged at the time as not recoverable. This area has been identified as improved grassland or as an ‘intensive use’ zone in recent surveys and reports.

Fixed Dunes (H2130)

Fixed dunes at the site cover a total area of 230.596ha, and are mapped as a number of discrete entities, separated by tracts of other habitats such as machair, or developments such as Carne golf course, which occupies a large area of dunes near the centre of the site.

Habitat quality varied considerably throughout the site, with some areas suffering the damaging affects of intensive agriculture, similar to those seen throughout the machair. Among the more damaging impacts are erosion, compounded by sand extraction, overgrazing, and supplementary feeding; the use of materials such as waste silage and spent mushroom compost in attempts to stabilise eroded dunes; fertiliser application and reseeding of swards. Other areas are subject to less intensive management, and more sustainable levels of grazing help to maintain species-rich short turf.

To the southwest of Annagh marsh, the fixed dunes are reasonably intact. Monitoring stops there confirmed good species diversity, low cover of negative species and grazing regimes compatible with the aims of conservation management, throughout much of the area. North of Annagh marsh, the fixed dunes are of mixed quality, with some parts fenced into strips and suffering damage similar to that seen in the adjacent machair.

Some of the most impressive dunes at the site are now within the boundaries of Carne golf course, and are excluded from the cSAC. A brief view of the golf course confirmed that some of the less intensively mown areas retain a quite diverse flora and high degree of interest. South of the golf course are some of the most damaged fixed dunes, with low species diversity, excessive cover of negative indicator species, including coarse agricultural grasses, and rank, ungrazed swards.

The better quality dunes contain a good diversity of typical species, among the most commonly encountered of which are *Anthyllis vulneraria* (Kidney vetch), *Bellis perennis* (Daisy), *Carex arenaria* (Sand sedge), *Euphrasia officinalis* agg. (Eyebright), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Hypochaeris radicata* (Cat's ear), *Lotus corniculatus* (Bird's-foot trefoil), *Luzula campestris* (Field wood-rush), *Plantago lanceolata* (Ribwort plantain), *Ranunculus bulbosus* (Bulbous buttercup), *Thymus polytrichus* (Wild thyme), *Trifolium repens* (White clover) and *Veronica chamaedrys* (Germander speedwell).

Other less common, though regularly seen species include *Achillea millefolium* (Yarrow) *Cochlearia officinalis* agg. (Scurvygrass), *Daucus carota* (Wild carrot), *Geranium molle* (Dove's-foot Crane's-bill), *Peltigera* sp. (lichen sp.), *Polygala vulgaris* (Common milkwort), *Rhinanthus minor* (Yellow rattle) and *Rumex acetosa* (Common sorrel).

Among the more common moss species noted were *Homalothecium lutescens*, *Rhytidiadelphus squarrosus*, *Scleropodium purum* and *Tortula ruraliformis*.

- **Dune Slacks (H2190)**

Three separate dune slacks, all of which can be considered as wet type slacks, were mapped at the site, the largest of which was in the fixed dunes south of Termoncarragh Lake and north of Carne golf club. Two very small slacks, one in the southwest of the site and the other in the fixed dunes to the west of Termoncarragh Lake, were also mapped. Among the typical species noted were *Calliergonella cuspidata*, *Carex arenaria* (Sand sedge), *C. flacca* (Glaucous sedge), *C. nigra* (Common sedge), *Hydrocotyle vulgaris* (Marsh pennywort), *Mentha aquatica* (Water mint) and *Prunella vulgaris* (Selfheal). In the largest slack, a number of species such as *Caltha palustris* (Marsh-marigold) and *Lychnis flos-cuculi* (Ragged-robin), suggested a freshwater input into the habitat.

While the largest of the slacks was in good condition with regard to species diversity, cover of negative indicator species, and other vegetation structure and functions attributes, the smaller two slacks were highly disturbed. Excessive cover of negative indicator species and severely poached ground were among the more obvious undesirable features noted there.

Dune Heath (H2150)

The relevant NATURA 2000 data form and site conservation plan refer to unpublished reports of a small area of 'Decalcified fixed dunes with *Empetrum* nigrum' (H2140) to the south-west of Termoncarragh Lake. However, the habitat was not encountered during fieldwork carried out in preparation of the site management plan, nor was it seen during the present survey. Explanatory notes accompanying the NATURA 2000 form suggest that recent intensive grazing has probably reduced the extent and quality of the habitat. It was also felt the site should be de-listed for the habitat because it had been destroyed or greatly reduced in extent (T. Curtis, unpublished). However, during the present survey, a sizeable area of dune heath (Atlantic Decalcified fixed dune (Calluno-Ulicetea)) was mapped in the southwest corner of the site

The underlying substrate in this area is peat, but some parts have a significant cover of sand and a presence of sand binding species such as *Carex arenaria* (Sand sedge). Best described as a Machair/Dune heath mosaic, the heath areas were defined by the presence of *Calluna vulgaris* (Heather). Other species noted in the habitat included *Carex arenaria* (Sand sedge), *C. flacca*

(Glaucous sedge), *C. nigra* (Common sedge), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Hypnum cupressiforme*, *Hypochaeris radicata* (Cat's ear), *Lotus corniculatus* (Bird's-foot trefoil), *Plantago maritima* (Sea plantain), *Polygala vulgaris* (Common milkwort), *Rumex acetosa* (Common sorrel) and *Thymus polytrichus* (Wild thyme).

Notable species in the more peat dominated areas included *Lychnis flos-cuculi* (Ragged-robin) and *Ophioglossum vulgatum* (Adder's-tongue).

The entire area containing Dune heath habitat is mapped as such on the site digital map, although it should be regarded as a Machair/Dune heath mosaic. Indeed, two machair monitoring stops were carried out in the area. The heath vegetation communities in this area appear to have been somewhat overlooked in the past. In the recent Biomar Machair survey (Crawford *et al*., 1996) no reference was made to dune heath in this area.

- **Mobile Dunes (H2120)**

Mobile dunes at Termoncarragh were, with the exception of a very small strip at Emlybegs in the south of the site, found at adjacent north- and south-facing strands in Tonamace at the north end of the site. Amounting in total to 2.577ha, the habitat was characterised by the presence of *Ammophila arenaria* (Marram). Foredunes on the south-facing strand are quite disturbed, with a high proportion of bare sand and a presence of negative indicator species such as *Cirsium arvense* (Creeping thistle) and *Senecio jacobaea* (Common ragwort).

Embryonic Dunes (H2110)

Embryonic dune at Termoncarragh was found around the seaward edge of dunes in the broad, sheltered Bay at Tonamace, and also along the seaward edge of the fixed dunes at Emlybegs, south of Carne golf course. Characterised by the presence of *Elytrigia juncea* (Sand couch), the habitat also had a number of other species such as the typical strandline species *Honckenya peploides* (Sea sandwort) and *Atriplex* (Orache) spp, as well as a certain amount of tidal litter. The total area of embryonic dune, at 1.305ha, may, like the similarly small total area of mobile dunes reflect the view expressed by Crawford *et al*. (1996), that the Mullet Peninsula sand dunes are showing signs of sediment depletion.

Shingle Vegetation (H1220)

A continuous strip of vegetated shingle, approximately 300m in length, in the sheltered Bat at Tonamace, represents the entire mapped area of the habitat at Termoncarragh. Among the species noted were *Honckenya peploides* (Sea sandwort), *Rumex crispus* (Curled dock) and *Tripleurospermum maritimum* (Sea mayweed). The shingle bank is bordered to the landward side by intensively farmed machair fields. Some disturbance to the habitat - possibly due to its location at the end of an access road or as a consequence of recent drainage channel construction operations - was noted.

Annual Strandline (H1210)

A single small stretch of annual strandline vegetation, of approximately 50m extent, in the small, sheltered strand near Tonamace, represents the entire area mapped at the site. The area in question has some locally recycling sand from an adjacent breach in the dunes, and recreational disturbance at the end of a track. This may partly account for the presence of strandline and foredune habitats in the area.

The habitat was dominated by *Atriplex* spp. Strandline species - mostly *Atriplex* (Orache) sp. and *Honckenya peploides* (Sea sandwort) - were also noted in the adjacent embryonic zone. The tiny amount of habitat mapped is all but irrelevant in the context of the entire site and was not assigned a conservation status assessment.

IMPACTS

Activities observed or known to be impacting on the sand dune habitats at Termoncarragh Lough are shown in Table 127B.

The most obvious factor that has affected the integrity of sand dune habitats at Termoncarragh has been the restructuring of agricultural land from unenclosed commonage grazing to individually owned, small striped fields (code 150).

Individual ownership has inevitably led to an intensification of agricultural activities (code 103), among which is the change that has taken place from a traditional seasonal grazing regime, to a situation where livestock are present on the land all year. To support this year round stocking system, supplementary feeding - mostly in the form of round baled silage in ring feeders - has become commonplace (code 171). Among the negative consequences of this are the concentration

of animals in small areas, which can lead to severely poached or bare soil, a decrease in species diversity as nitrophilous weed species such as *Cirsium arvense* (Creeping thistle) and *Urtica dioica* (Common nettle) become common, and the introduction of coarse grass seeds in hay or silage. Pens or enclosures for holding stock in field corners has also led to localised patches of damage, as have the shelters and water troughs that are commonly seen.

High stocking densities have also become more prevalent, and densities of around 2 livestock units/ha have recently been the norm in some parts of the sites, including the fields near the cemetery north of Termoncarragh Lake (D. Suddaby, pers. comm.). Cattle account for much of the overgrazing (code 143), although Termoncarragh is one of the few areas on the peninsula where sheep grazing (code 142) is also common. Horses and donkeys, as is typical throughout the Peninsula sand dune sites, also form a small component of the total grazing stock.

Rabbits, although obviously present at the site, were not notably abundant during the site visits, although numbers may have been unusually low due to an apparent recent spread of myxomatosis. However, burrowing activities appeared to be exacerbating the eroded condition of some fixed dune ridges (code 146).

Although overgrazing and overstocking are among the major problems at the site, grazing (code 140) can also be regarded as positive in some areas where stocking levels are lower, yet sufficiently high to maintain species-rich short turf.

Overstocking has also led to erosion of vegetation and the development of blowouts, a problem which in some cases has been compounded by the introduction of material such as spent mushroom compost in an effort to stabilise the affected areas. This activity, observed in the dunes north of Termoncarragh and thought to occur elsewhere, is referred to here under code 190 – 'agricultural activity not referred to elsewhere'. The same activity is thought to have occurred within the golf course area. The affect of this practice can be the promotion of weed species, as localised nutrient inputs creates the eutrophic conditions in which they prosper.

Table 127B Intensity and impact of various activities on sand dune habitats at Termoncarragh Lough

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H21A0	103	A	-1	180	Inside
H2130	103	A	-1	160	Inside
H21A0	120	A	-1	180	Inside
H2130	120	B	-1	150	Inside
H2130	140	A	+2	120	Inside
H21A0	142	A	-1	10	Inside
H21A0	143	A	-1	100	Inside
H2130	143	A	-1	100	Inside
H2150	143	C	-1	6	Inside
H2190	143	A	-1	0.6	Inside
H21A0	146	C	-1	20	Inside
H2130	146	B	-1	20	Inside
H21A0	150	A	-1	180	Inside
H2130	150	A	-1	100	Inside
H21A0	171	A	-1	5	Inside
H2130	171	A	-1	4	Inside
H2190	171	A	-1	0.1	Inside
H21A0	190	A	-1	2	Inside
H2130	190	A	-1	1	Inside
H21BB	300	A	-2	Unknown	Inside
H2120	421	C	-1	0.1	Inside
H21A0	421	C	-1	1	Inside
H2130	421	C	-1	1	Inside
H2130	601	A	-2	108	Outside
H21A0	622	C	-1	10	Inside
H2130	622	C	-1	5	Inside
H2110	623	B	-1	0.1	Inside
H2120	623	B	-1	0.1	Inside
H21A0	623	A	-1	30	Inside
H2130	623	A	-1	10	Inside
21BB	701	D	0	Unknown	Inside
H2110	900	A	-1	Unknown	Inside
H2120	900	A	-1	Unknown	Inside
H2130	900	C	-1	Unknown	Inside

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

Other agricultural management practices with negative consequences for the conservation status of dune habitats have included the reseeding of swards with agriculturally productive grasses such as *Lolium perenne* (Perennial rye-grass), and the increased use of fertilisers (code 120). These measures facilitate higher stocking rates and improve the quality and yield of winter feed for stock. Application of chemical fertilisers, which was observed in a number of machair fields during the site visits, has apparently replaced the low-intensity use of traditional fertilisers such as seaweed.

Vehicle tracks (code 623), particularly those of agricultural vehicles, are common throughout the site, reflecting the high level of farming activities. Among the consequences are compacted soil and eroded vegetation.

Sand and shingle extraction (code 300) is known to have occurred in a number of locations throughout the Mullet sand dune sites. The materials are used for several purposes including the creation of tracks, and in the case of sand, as a fertiliser, due to its high shell content. The exact extent of the problem is difficult to quantify, as it most likely takes place on a small scale over many locations, and may only be discernible for a limited period after the event. Sand extraction locations may also be confused with natural blowouts.

Some small scale dumping was seen in machair and fixed dunes. Dumped articles included fish boxes, kitchen appliances, netting, silage wrap plastic and general household waste (code 421). A small rubbish-burning site was also noted in the fixed dunes.

Walking and associated activities (code 622) have led to the creation of worn tracks and pathways, although the impacts of most recreational activities are largely confined to access points and road ends. In general, recreational impacts on the site are relatively low, which may be attributable to the fact that agriculture is the major land use; the low population density of the area; and the fact that some of the larger and more impressive beaches on the Mullet Peninsula are further south.

Cars and other vehicles may access the beach (code 623) at the strand near Tonamace, which has consequences for the integrity of foredunes and other habitats. On one of the survey dates, youths were observed practising driving manoeuvres on the beach.

Water pollution (code 701) is included on the list of impacts although the extent and intensity of its possible affects on sand dune habitats are difficult to assess. However, it seems likely that run-off from fertiliser application will lead to some eutrophication of groundwater.

A large area of dunes, including some of the most impressive tall dunes has been lost to Carne golf course (code 601), which opened in 1992. The entire golf course area is now excluded from cSAC.

There is evidence of natural erosion (code 900) at the seaward edge of habitats. Foredunes are occasionally eroded and breached, and where foredunes are absent, other habitats such as fixed dunes are affected.

A drainage channel from Termoncarragh Lough to the strand near Tonamace, constructed several years ago, may have caused some disruption to habitats, although there are currently no discernible affects.

Several activities coming under the broad heading of fishing, hunting & collecting were included in the NATURA 2000 data form list of impacts, although none of these have any obvious direct influence on sand dune habitats.

CONSERVATION STATUS

The overall conservation status assessment of each habitat at Termoncarragh Lough is based on a combination of *Habitat Extent*, *Structure & Functions*, and *Future Prospects* assessments (Table 127C). Vegetation structure and functions are generally assessed by the use of monitoring stops. The results of those stops carried out are shown in Table 127D.

Much of the information in the relevant NATURA 2000 data form and site conservation plan is not directly comparable with the present data. In terms of habitat areas, the estimated percentage cover for each habitat refers to the cSAC as a whole, which - as the current report deals with eight sand dune sites individually - is of little value for comparative purposes. In any case, approximations of habitat extent in those reports are based on less accurate methods of assessments than those employed here.

The recent Biomar Machair survey (Crawford *et al*., 1996) included Termoncarragh Lough (in addition to Cross Lough and Aghleam) among the survey sites. However, its usefulness for the purposes of comparison with the present data are limited by the fact that habitat classification and mapping in that survey was based on the National Vegetation Council (NVC) system of classification, whereas the current survey is based on Annex I habitats of the EU Habitats Directive. Nevertheless, habitat maps, relevés, and information on certain impacts and activities were of some value for the purposes of comparison with the present results.

Table 127C Conservation status of Annex I sand dune habitats at Termoncarragh Lough

Habitat[1]	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system[2]
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**		
Machair (H21A0)	Extent		Future prospects/ Structure & functions	**Unfavourable - Bad**	**Unfavourable-Declining**
Fixed Dunes (H2130)	Extent		Structure & functions/ Future prospects	**Unfavourable - Bad**	**Unfavourable - Declining**
Dune Slack (H2190)	Extent/ Structure & functions	Future prospects		**Unfavourable - Inadequate**	**Unfavourable-Declining**
Dune Heath (H2150)	Extent/ Structure and functions	Future prospects		**Unfavourable - Inadequate**	**Unfavourable-Unchanged**
Mobile Dunes (H2120)	Structure & functions	Extent/Future prospects		**Unfavourable - Inadequate**	**Unfavourable-Declining**
Embryonic Dune (H2110)	Structure & functions	Extent/Future prospects		**Unfavourable - Inadequate**	**Unfavourable-Unchanged**
Perennial Shingle (H1220)	Extent/ Structure & functions	Future prospects		**Unfavourable - Inadequate**	**Unfavourable-Unchanged**

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

Machair (H21A0)

Although there has clearly been a recent decline in the condition of machair at Termoncarragh, there is no direct evidence of a decrease in habitat area. No areas previously considered as machair have been excluded, or mapped as improved agricultural ground on the basis of changing management. Habitat extent is therefore considered to be *favourable*.

Of 24 monitoring stops carried out in machair throughout the site, 20 passed and four failed the overall minimum standard (Table 127D), indicating *unfavourable-inadequate* habitat structure and functions. Three of the failed stops were in striped fields to the northwest of Termoncarragh Lake, where habitat damage due to intensive agricultural activities was most evident. In each of the failed monitoring stops, diversity of typical species was less than the required minimum number, while total bryophyte cover was less than the minimum threshold. The total cover of negative indicator

species, most of which was accounted for by *Lolium perenne* (Perennial rye-grass) and *Dactylis glomerata* (Cock's-foot), was also excessive in each case, and in one instance exceeded 80%.

Table 127D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Termoncarragh Lough

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Machair (H21A0)	20	4	**Unfavourable - Inadequate**
Fixed Dunes (H2130)	10	5	**Unfavourable - Bad**
Perennial Shingle (H1220)	4	0	**Favourable**
Embryonic Dune (H2110)	7	0	**Favourable**
Mobile Dune (H2120)	2	0	**Favourable**
Dune Slack (H2190)	2	0	**Favourable**

However, some of the most damaged machair habitat was probably underrepresented in the monitoring stops protocol, due to the inclusion of these areas in the rapid visual assessment of each striped field. It was also thought unnecessary to apply monitoring stops to all of the most severely affected areas, though it may be assumed that were monitoring stops allocated to these damaged areas in proportion to the area they cover, then more than 25% of all monitoring stops would have failed. For this reason, vegetation structure and functions are rated *unfavourable-bad*.

The quality of machair habitat has seemingly declined considerably in recent years, primarily due to the intensification of agricultural activities, brought about by the division of open commonage land into individually owned striped fields. As the resultant management practices such as overstocking, and fertilisation and reseeding of swards are ongoing and likely to lead to a further deterioration in habitat integrity, the future prospects of machair must be regarded as *unfavourable-bad*. Although the recent decline in machair habitat quality on the Mullet peninsula has focussed the attention of NPWS staff on the need to implement restoration measures, there is currently no guarantee that such a task can be accomplished, given the inherent difficulties, such as the large areas involved and the problems of multiple ownership of land. In the NATURA 2000 standard data form, the restoration possibilities were considered to be Ranking II – 'restoration possible with average effort'. This is based on the assumption that machair would generally respond quickly to sympathetic changes in land use, although there is apparently no precedent for such an undertaking.

As two of the elements of conservation status – in this case vegetation structure and functions, and future prospects – are *unfavourable-bad*, the overall habitat assessment for machair is also *unfavourable-bad*.

The most appropriate Irish conservation status assessment is *unfavourable-declining*, given the ongoing agricultural practices which are having a deleterious affect on the integrity of machair habitat at Termoncarragh.

Re-interpreting the quadrats carried out as part of the Biomar machair survey report of 1996 (Crawford *et al*.) provides a useful comparison with the results obtained in the present survey. All of the attributes examined in the current monitoring stop protocols are covered by the various data collected for the quadrats of the earlier survey, with the result that each of those quadrats may be examined and assigned either a pass or fail rating. The data from the previous survey were similar to those of the present survey in that the areas identified here as being among the more intensively managed were also seen to be in poor condition by the time of the earlier survey. Several of the quadrats in the fields to the north of Annagh Marsh had a high cover of negative indicator species – the most common of which were *Cirsium* vulgare (Spear thistle) and *Senecio jacobaea* (Common ragwort). Species diversity was also generally low with very few quadrats having as many as 20 species and often considerably less. Similar comparisons of the two sets of data in other parts of the site also revealed broadly similar results.

Direct comparisons between the two sets of data are not always particularly revealing as the division of much of the site into small fields with various management regimes means that some quadrats from the earlier survey, that are even quite closely adjacent to monitoring stops carried out in the present survey, may be in areas that are managed in a quite substantially different way. However, the general comparison reveals that the pattern of intensification of agricultural management and consequent widespread deterioration in habitat quality now seen had been well established by the time of the earlier survey.

Fixed Dunes (H2130)

Although blowouts and other eroded areas have been created by unsustainable management practices such as overgrazing and supplementary feeding, there has been no discernible overall loss in the area of fixed dune at the site. Habitat extent is therefore considered as *favourable*. The loss of

a large area of fixed dune to the golf course development is not considered here, as it pre-dated the most recent survey and reports, such as the site conservation (MPSU) plan.

Of the 15 monitoring stops carried out in fixed dunes, 10 passed and five failed the overall criteria which, as a failure rate of over 33%, indicates *unfavourable-bad* habitat structure and functions. Each of the failed stops had less than the required minimum number of typical species, which in most cases was combined with an excessive cover of agricultural grasses, most notably *Lolium perenne* (Perennial rye-grass), which alone exceeded 5% cover in two of the stops. Also present in one of the failed stops, and at a lower percentage cover in several other stops, was *Senecio jacobaea* (Common ragwort). Common nettle, *Urtica dioica*, was present in one of the failed stops, while other species indicative of agricultural improvement, although not on the negative indicator species list, included *Dactylis glomerata* (Cock's-foot) and *Poa trivialis* (Rough meadow-grass). The three failed monitoring stops all failed the sward height criteria, while one had less than the minimum number of typical species.

Four of the failed fixed dune stops were in the southern end (south of Carne golf club) of the site, while the other was in the habitat northwest of Annagh Marsh.

As significant areas of fixed dune, like much of the machair, have declined in condition over recent years following the restructuring of field boundaries and intensification of agricultural activities, the future prospects of the habitat are rated as *unfavourable-bad*. Several negatively impacting activities are ongoing and likely to lead to further deterioration in habitat quality. Although the general loss in quality of sand dune habitats on the Mullet peninsula in recent years has focussed the attention of conservation staff on the area, and on the need to implement habitat rehabilitation measures, there are currently no guarantees that any such measures will be successfully enacted.

As the individual parameters of habitat conservation status assessment include *unfavourable-bad* ratings, that is the overall EU assessment that applies to fixed dunes at Termoncarragh.

The Irish conservation status assessment thought most appropriate is *unfavourable-declining*, due to the obvious deterioration in habitat quality at the site in recent times.

Dune Slacks (H2190)

The areas of dune slack mapped here were not distinguished as such on a number of previous habitat maps. They may have previously been overlooked due to their relatively small size and location within very large expanses of other sand dune habitats. As there is no indication of a loss of area in recent times, the habitat is rated as *favourable* for extent.

Two monitoring stops, both carried out in the largest area of slack, passed the overall target criteria, indicating *favourable* habitat structure and functions. Some of the wetter parts of the slack have suffered some degree of poaching, but the percentage cover of bare ground was less than 5% in both of the monitoring stops. However, the smaller slacks were in less favourable condition, with more severe poaching and disturbance in both. Negative indicator species – most notably *Cirsium arvense* (Creeping thistle) and *Senecio jacobaea* (Common ragwort) – dominated one of the slacks, and were common in the other. The former case is mostly attributable to the positioning of a ring feeder in the slack. Monitoring stops were not carried out in either of these smaller slacks, as the severely damaged nature of each automatically indicated *unfavourable-bad* structure and functions. For this reason, the overall habitat structure and functions are rated *unfavourable-bad* despite the monitoring stop results.

The future prospects for dune slacks cannot be said to be *favourable*, as there is currently no guarantee of management practices that would ensure their integrity. The largest area of slack noted at the site had some poached ground, and is adjacent to an area that has been particularly badly affected by the positioning of ring feeders and the holding of excessive stock numbers. For this reason, the future prospects of dune slacks are rated as *unfavourable-inadequate.*

As the three components of habitat conservation status assessment include an *unfavourable-bad* assessment i.e. that of vegetation structure and functions, the overall assessment is also *unfavourable-bad*.

Assigning a corresponding Irish conservation status assessment to the habitat is difficult insofar as the habitat seems to have gone unreported in other recent surveys. It seems likely however, that the condition of dune slacks will have recently declined, in keeping with the general trend at the site. Therefore, it is thought most appropriate to adjudge the conservation status as *unfavourable-declining*.

Dune Heath (H2150)

The area of dune heath mapped at the site is referable to the Annex I habitat 'Atlantic Decalcified Fixed dune (Calluno-Ulicetea)'. Previous records of dune heath at Termoncarragh refer to 'Decalcified fixed dunes with *Empetrum nigrum* (H2140)', although this habitat is believed to be either no longer present, or so overgrazed that *E. nigrum* (Crowberry) is no longer part of the flora. As the dune heath mapped here has apparently not been recorded before, and in the absence of any signs of damage that may have resulted in a recent loss of area, the habitat is rated *favourable* for extent.

Monitoring stops were not carried out in the assessment of dune heath vegetation structure and functions, as it had become clear by the time of the Termoncarragh Lough site visits that a monitoring protocol based on that of the JNCC would not be appropriate for the examples of the dune heath habitat found in Ireland. A review of the entire national resource of dune heath would suggest that the vegetation structure and functions of few, if any, examples of the habitat can be adequately monitored using a set of attributes and targets that closely match those of the JNCC common standards monitoring protocol. Therefore, where a reasonable diversity of typical species is found, and where there are no obvious signs of serious disturbance to the integrity of the habitat (as was the case at Termoncarragh), vegetation structure and functions can be regarded as *favourable*.

Although there were no signs of serious disturbance to the dune heath, there was some evidence of overgrazing and poaching of ground. As there is currently no guarantee that plans ensuring the sustainable management of this and other habitats on the Mullet Peninsula will be implemented, the future prospects must be regarded as *unfavourable-inadequate*.

A combination of *favourable* and *unfavourable-inadequate* assessments for the individual parameters of habitat conservation status dictates an overall EU assessment of *unfavourable-inadequate*.

Although there is no evidence of a recent decline in extent, nor in the integrity of vegetation structure and functions, uncertainty regarding the future management of the habitat suggests an Irish conservation status assessment of *unfavourable-unchanged* is the most appropriate.

Mobile Dunes (H2120)

The distribution of mobile dunes is almost totally limited to the closely adjacent strands near Tonamace in the northern part of the site. The meagre amount of habitat reflects the belief that the Mullet sand dune systems are showing signs of sediment depletion and erosion (Crawford *et al*., 1996). The current areas of mobile dune do not appear to be substantially smaller than those mapped in the survey referred to above, although the overall poor distribution of habitat suggests that an *unfavourable-inadequate* rating is advisable for habitat extent.

Both of the mobile dune monitoring stops passed the overall requirements, indicating *favourable* habitat structure and functions. The two stops were carried out behind the small south-facing beach at Emlycass, to the northwest of Carne golf club. Although some cover of negative indicator species – represented by *Cirsium arvense* (Creeping thistle) and/or *Senecio jacobaea* (Common ragwort) – was noted, the total cover in both stops was below the 5% limit, above which the attribute would fail the prescribed target.

Foredune habitats may be less directly susceptible to the affects of intensive farming practices that have become prevalent at the site in recent years due to the fact that they are generally outside the areas of striped fields. However, the affects of erosion and grazing were seen at the site where foredunes have been eroded and breached, and negative indicator species such as *Cirsium arvense* (Creeping thistle) and *Senecio jacobaea* (Common ragwort) have become established. The fact that there is no guarantee of the implementation of plans for more sustainable management regimes, and the fact that the Mullet dune systems are showing signs of sediment depletion (Crawford *et al*., 1996) suggests the future prospects of the habitat should be regarded as *unfavourable-inadequate*.

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

The corresponding Irish conservation status assessment thought most appropriate is *unfavourable-declining*, due to deleterious affects of intensive agriculture that have increased in recent times, and the evidence that sediment depletion is now characteristic of Mullet sand dune systems.

Embryonic Dunes (H2110)

Embryonic dunes, amounting in total to 1.305ha were mapped at two locations. A thin band on the seaward side of mobile dunes, extended over the inner part of the sheltered Bay near Tonamace,

while a narrow strip at Emlybegs, to the south of the golf course appeared to be freshly accumulating at the edge of eroded fixed dunes. The current distribution of embryonic dune seems to quite closely match the distribution of SD4a communities (Elymus farctus spp. boreali-atlanticus community) in the recent survey of Irish machair sites (Crawford *et al*., 1996), although the more southerly zone may have been locally reworked to a more southerly location. Also, a strip of habitat mapped in the earlier survey on the south-facing strand in Emlycass was not noted in the current survey. Breaching of the foredunes at this strand can be seen on the site aerial photograph. As zonation is patchy throughout the site - with a number of sandy beaches lacking foredune development - and due an apparent recent decline in total area, embryonic dunes are rated *unfavourable-inadequate* for extent.

All seven of the monitoring stops used to assess habitat structure and functions in embryonic dunes passed the overall target criteria, indicating a *favourable* rating for that element of conservation status assessment. All stops had sufficient cover of *Elytrigia juncea* (Sand couch) to satisfy the typical species criterion, while an insignificant cover of the negative indicator species *Cirsium arvense* (Creeping thistle) in one of the stops was the only other deviation from the desired attribute targets.

The future prospects for embryonic dunes are compromised by the fact that the site is believed to be undergoing sediment depletion. Sand extraction activities also appear to take place with relative impunity and may add to erosion in foredune habitats. For this reason, the future prospects are rated *unfavourable-inadequate*.

The overall EU conservation status, being based on a combination of *favourable* and *unfavourable-inadequate* assessments, is also *unfavourable-inadequate*

The selected Irish conservation status assessment is *unfavourable-unchanged*, as it appears the habitat has been of a similar extent and condition over some time.

Perennial Shingle (H1220)

In the absence of any data to suggest a recent decline in area, perennial vegetation of stony banks is rated as *favourable* for habitat extent. The habitat was not included in the NATURA 2000 standard data form for the cSAC, but may have been overlooked due to its small area.

All four monitoring stops in perennial shingle passed the overall target criteria, indicating *favourable* vegetation structure and functions. Cover of negative indicator species, represented by *Cirsium vulgare* (Spear thistle) and *Senecio jacobaea* (Common ragwort), did not exceed the combined 5% cover limit in any of the stops.

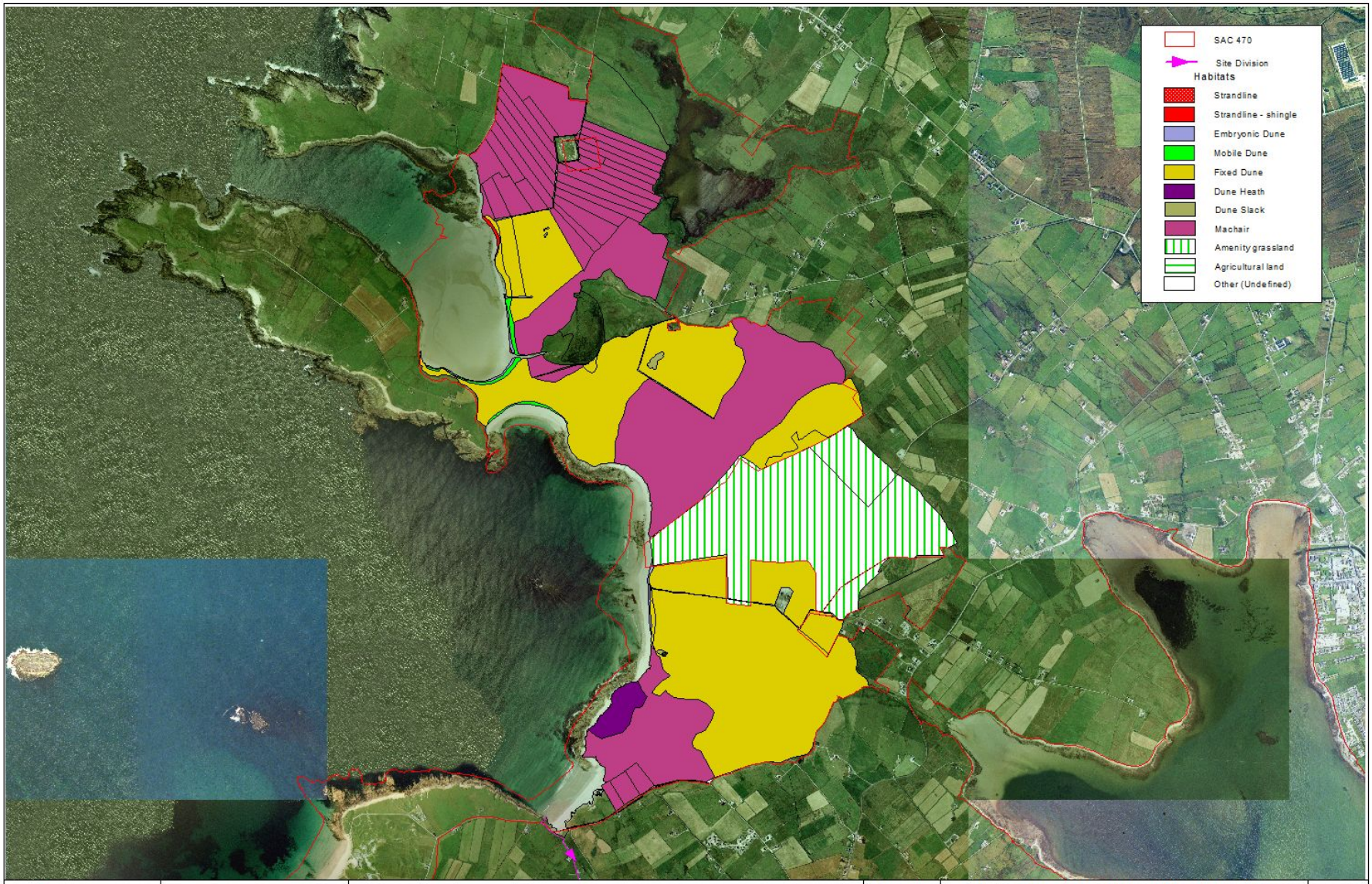
Although the habitat may be less susceptible than dune grassland habitats to the negative influences brought about by recent changes in farming practices, its future prospects cannot be said to be *favourable*. This is due to the fact that some degree of disturbance - particularly adjacent to tracks - was noted at the site, and because extraction of shingle (and sand) is known to have taken place throughout the site for a long period. As the future integrity of the habitat is less than guaranteed, its future prospects are rated *unfavourable-inadequate*.

As the three elements of habitat conservation status assessment are a combination of *favourable* and *unfavourable-inadequate*, the overall EU assessment must be *unfavourable-inadequate*.

The same difficulties regarding lack of previous data that applied to assessing the EU conservation status also influence the Irish conservation status assessment. However, as there is a certain degree of current damage but no evidence of a persistent recent decline in condition, the assessment chosen is *unfavourable-unchanged*.

Annual Strandline (H1210)

As only a tiny area of annual strandline vegetation was mapped as a distinct habitat, it was not assigned a conservation status assessment, nor were monitoring stops carried out. The estimation of extent provided here may serve as a baseline measurement with which future trends can be compared.


SAC 470
Site Division
Habitats
Strandline
Strandline - shingle
Embryonic Dune
Mobile Dune
Fixed Dune
Dune Heath
Dune Slack
Machair
Amenity grassland
Agricultural land
Other (Undefined)
Coastal Monitoring Project 2004-2006
Termoncaragh Lough
Mullet / Blacksod Complex (SAC 470)
CMP code: 127
0 300 600 900 1200 1500 Meters
N
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:36394
National Parks and Wildlife Service

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

SITE DETAILS

CMP06 site name: **Dooyork** CMP06 site code: **119** CMP Map No.: **?**

County: **Mayo** Discovery map: **22** Grid Reference: **F 204 381**

6 inch Map No.: **MA 25**

Aerial photographs (2000 series): **O1304-A; O1304-B; O1304-C; O1304-D**

NPWS Site Name: **Mullet / Blacksod Complex**

NPWS designation: pNHA: **470** cSAC: **470**

Ranger Area:

MPSU Plan: **Draft II – Consultation (2001)**

SITE DESCRIPTION

Dooyork sand dunes and machair on the eastern side of Blacksod Bay in northwest Mayo, are approximately 3km west of Gweesalia (Gaoth Sáile), and are within the Mullet/Blacksod Complex cSAC. The western side of the dunes extends over approximately 1.3km of coastline, while a north facing stretch of coastline is roughly 0.5km in length.

Also on the east side of Blacksod Bay, and included in the cSAC are Doo Lough, Srah North and Srah South. Doo Lough lies to the north of Dooyork, across the mouth of a small estuary in Blacksod Bay. The large sites of Termoncarragh Lough, Cross Lough, Leam Lough and Aghleam, on the west side of the Mullet peninsula, complete the full complement of significant sand dune systems in the cSAC.

Much of the total cSAC area – an estimated 60% in the NATURA 2000 standard data form – is accounted for by marine areas and sea inlets, while the machair and sand dune component (including sand beaches) is estimated as 16% of the total area. The other habitat class that represents a significant proportion of the total area is that which encompasses tidal rivers, estuaries, mud flats, sand flats and Lagoons.

The cSAC has been proposed for designation due to the presence of machair, fixed dune and decalcified dune heath with *Empetrum nigrum* - all priority Annex I habitats - although the status of the latter, which has been recorded at Termoncarragh Lough (site 127), is in some doubt. The cSAC

may be de-listed for that habitat as it is apparently either no longer present, or *E. nigrum* forms such a minor component of the vegetation, as to be almost irrelevant.

The total mapped area of sand dune habitats at Dooyork is over 35ha, most of which is accounted for by machair, which covers 31.562ha (Table 119A). Most of the remaining area is fixed dune, which amounts to over 3.7ha, while mobile dunes (Shifting dunes along the shoreline with *Ammophila arenaria*) - the other Annex I sand dune habitat present – comprises a very small portion of the total area.

Table 119A Areas of EU Annex I habitats mapped at Dooyork

EU Code	EU Habitat	Area (ha)
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	0.140
H2130	Fixed coastal dunes with herbaceous vegetation	3.732
H21A0	Machair	31.562
	Total Sand dune	**35.434**

There is a wide beach of fine-grained sand along the west and north sides of the dunes, although amenity use is almost certainly very low, due to the agricultural nature of the site. The dune grassland is in the form of open commonage, on which several owners have grazing rights. Cattle currently graze the dunes, although the commonage management system has helped to protect the site from some potentially damaging affects of intensive stock rearing.

Large tracts of open commonages on the Mullet Peninsula were sub-divided by the land commission in the 1980's, allowing shareholders to own and manage their own individual areas. This has led to a general intensification of agricultural management regimes there, with the result that much of the sand dune habitat, particularly machair, has been damaged. However, Dooyork, like Doo Lough, has largely avoided this restructuring process, with the result that the machairs there have retained their conservation value, and have consequently gained in relative importance. They are probably the best remaining examples of the habitat in the cSAC.

The rare Annex II liverwort species *Petalophyllum ralfsii* (Petalwort) has previously been recorded from the site, although only very limited numbers of thalli were found. The approximate known location is included here as a theme on the site digital map. A brief search during the site visit for the present survey failed to produce any further records.

The site may be accessed on a road (included as the 'access' theme on site digital map), at the south end of the site, which continues as a track along the south and west sides of the dune system

Machair (H21A0)

Machair forms the greater part of the total sand dune area at Dooyork and is a fine example of the habitat. The machair is largely intact and undamaged, contains both wet and dry areas with a corresponding variety in vegetation composition; and forms interesting transitions to marsh habitats.

The relative importance of the machair within the Mullet/Blacksod cSAC, and indeed nationally, has certainly increased in recent times, as most of the habitat has remained unenclosed, unlike much of the that on the Mullet Peninsula, where the division of commonages into small fenced strip fields, has precipitated a rapid deterioration in the conservation value of much of the machair habitat.

The machair sward was quite uniformly cattle-grazed (although not overgrazed), to a maximum height of approximately 15cm. Species diversity in both wet and dry areas was reasonably high throughout much of the site. Among the common species found in drier areas were *Bellis perennis* (Daisy), *Euphrasia officinalis* agg. (Eyebright), *Galium verum* (Lady's bedstraw), *Plantago lanceolata* (Ribwort plantain), *Prunella vulgaris* (Selfheal), *Thymus polytrichus* (Wild thyme) and *Trifolium repens* (White clover). Also found, though not common, was *Coeloglossum viride* (Frog orchid).

Common species in wet machair included *Anagallis tenella* (Bog pimpernel), *Carex flacca* (Glaucous sedge), *C. nigra* (Common sedge), *Hydrocotyle vulgaris* (Marsh pennywort), *Prunella vulgaris* (Selfheal) and *Selaginella selaginoides* (Lesser clubmoss). Less common species in wet machair included *Cardamine pratensis* (Cuckooflower) and *Lychnis flos-cuculi* (Ragged-robin).

The more common moss species found included *Calliergonella cuspidata*, *Homalothecium lutescens*, *Rhytidiadelphus squarrosus* and *R. triquetrus*.

In the northeast corner of the site, there is a transition zone between machair and the saltmarsh vegetation that fringes a wide river channel at the eastern side of the site. Among the common

saltmarsh species associated with typical machair species here were *Armeria maritima* (Thrift) and *Glaux maritima* (Sea-milkwort).

In the southern half of the site, vegetation fringing the river channel and bordering the machair zone is of a freshwater or fen type, and again, there is a transition zone between this and the machair. Peaty soil is exposed here and among the species noted were *Caltha palustris* (Marsh-marigold), *Eriophorum* sp. (Bog cotton), *Iris pseudacorus* (Yellow Iris), *Pinguicula vulgaris* (Common butterwort) and *Succisa pratensis* (Devil's-bit scabious). Because of the wet nature of the soil, there is some degree of poaching here. Peat soils underlying the sand dunes can be clearly seen in the south end of the site where erosion of the seaward edge of dune grassland has exposed a profile of several metres depth. The dunes have eroded over time, as is evident from comparison with the site 6' map, and the eroded edge of machair stands 3 or 4m above the beach level in the south end of the site.

Fixed Dunes (H2130)

Fixed dunes form a relatively small part of the total dune area, consisting of a narrow strip, up to 60m wide, in the northern half of the site. On the landward side of the narrow fixed dune area, lies the wide machair plain that comprises most of the total sand dune area.

A certain portion of the fixed dune grassland from the seaward edge is more open and semi-fixed, while the high proportion of bare ground throughout the habitat can be clearly seen on the site aerial photographs. This is probably due to disturbance by cattle – a judgement reinforced by the presence in places of a significant cover of weed species, the most common of which are *Cirsium arvense* (Creeping thistle) and *Senecio jacobaea* (Common ragwort).

Also commonly found in both the semi-fixed and bare areas of fixed dunes were *Eryngium maritimum* (Sea-Holly) and *Tussilago farfara* (Colt's-foot).

Fixed dune vegetation has slumped over the eroded front dune face, and become stabilised in places. There is a sparse cover of *Ammophila arenaria* (Marram) re-vegetating much of the eroded front face of the dunes, but little that should be considered as a distinct foredune habitat.

Species diversity is generally not high, as is reflected in the monitoring stops carried out, although the minimum targets were met in each case. Among the typical species present were *Cerastium*

fontanum (Common mouse-ear), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Bird's-foot trefoil) and *Plantago lanceolata* (Ribwort plantain). The dune grassland is grazed by cattle and most of the fixed dune area has a fairly close cropped sward, with a sparse cover of *Ammophila arenaria* (Marram) present throughout.

Dune slacks are not a feature of the fixed dune area, although much of the machair plain is of a wet type, with several of the species typically associated with dune slack habitat.

Mobile Dunes (H2120)

Mobile dunes at Dooyork are very limited in area, amounting to only 0.14ha, and confined to the recurved tip at the northern extreme of the site. A narrow band of habitat, mostly less than 5m wide, and characterised by the dominance of *Ammophila arenaria* (Marram) extends around much of the tip. The current shape and extent of the recurve are very similar to that outlined on the 6' map, which is included as a theme on the site digital map.

Much of the vegetation on the exposed west side of the tip is somewhat eroded, with much of the Marram being of a rather unhealthy appearance. This is probably due to the fact that erosion appears to be affecting the entire west edge of the site, and depleting the available sediment supply. Some of the sheltered habitat on the east side of the tip was more intact, with vegetation of a more robust and healthy appearance.

Embryonic Dunes (H2110)

There was some sparse embryonic dune type growth – composed of *Elytrigia juncea* (Sand couch) - in the east side of the north tip of the dunes, but it was not significant enough to warrant mapping as a distinct habitat.

Annual Strandline (H1210)

There were no sufficiently large stands of strandline vegetation to warrant mapping as strandline habitat, although *Honckenya peploides* (Sea sandwort) was occasional along the strand.

IMPACTS

The activities observed or known to be impacting on the sand dune habitats at Dooyork are shown in Table 119B.

The dune grassland is cattle-grazed (code 140), and although overgrazing does not seem to be a current issue in the machair, the high proportion of bare ground in the fixed dunes indicates a stocking rate which may be unsustainable for the structural integrity of the vegetation (code 143).

Table 119B Intensity and impact of various activities on sand dune habitats at Dooyork

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H21A0	140	A	+2	31	Inside
H2130	143	B	-1	3.7	Inside
21BB	620	C	0	35	Inside
H21A0	623	A	-1	2.0	Inside
H21A0	900	A	0	Unknown	Inside
H2130	900	A	0	Unknown	Inside

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

Recreational use of the site (code 620) is probably very low due to the agricultural management of the land. Access to the site, while easily identifiable on the relevant ordinance survey map, is somewhat forbidding to the casual user, as it requires passage through a farm gate. The area is also quite remote and probably little known to potential beach users.

The road by which one may enter the site continues as a vehicle track (code 623) across the entire length of the site, and is easily discernible on the site aerial photographs.

Natural erosion (code 900) appears to be exerting a considerable influence on the dune grassland. The changing profile of the dune area over time can be seen by comparison with the site 6' map. A marked retreat of the dunes on the west side appears to be an ongoing phenomenon, as clumps of vegetation had clearly recently slumped over the eroding edge. The disparity between the current western extreme of the dunes, and that shown on the 6' map, exceeds 70m in places.

CONSERVATION STATUS

The overall conservation status assessment of each habitat at Dooyork is based on a combination of *Habitat Extent, Structure & Functions,* and *Future Prospects* assessments (Table 126C). Vegetation structure and functions are generally assessed by the use of monitoring stops. The results of those stops carried out are shown in Table 126D.

As is the case with all of the Mullet/Blacksod Complex sites, previous data on habitat extent, such as those in the relevant NATURA 2000 data file or MPSU plan, are of little use for the purposes of comparison with the current data. Habitat areas in those reports are estimated for the entire cSAC, with no indication as to the relative proportions in each of the 8 sand dune sites into which the Complex is divided here. For this reason, consideration of the conservation status of habitat extent is based on the current condition of the habitats. Similarly, there are no previous data with which the current status of vegetation structure and functions attributes may be adequately compared, so this element of conservation status is also based on the current condition of the habitats.

Dooyork was not included in the Biomar survey of 1996 (Crawford *et al.*), although the relative importance of the site has probably increased since then.

Machair (21A0)

Machair extends to the seaward edge of the dunes in the south of the site, and is flanked by a narrow band of fixed dunes in the northern half. The dune system as a whole has retreated, and machair vegetation is currently eroding and slumping in the south of the site. As is the case with the fixed dunes, this may be due to natural processes, and so habitat extent is considered *favourable*.

Table 119C Conservation status of Annex I sand dune habitats of the subsites at Dooyork

Habitat[1]	**EU Conservation Status Assessment**				
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**	**Overall EU conservation status assessment**	**Proposed Irish conservation status system**[2]
Machair (21A0)	Extent/ Structure & functions	Future prospects		**Unfavourable - Inadequate**	Unfavourable - Unchanged
Fixed Dunes (H2130)	Extent	Structure & functions/ Future prospects		**Unfavourable - Inadequate**	Unfavourable - Unchanged
Mobile Dunes (H2120)			Extent/ Structure & functions/ Future prospects	**Unfavourable - Bad**	Unfavourable - Unchanged

[1] EU Codes as per Interpretation Manual

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

All 8 machair monitoring stops carried out to assess vegetation structure and functions passed the requisite standard, indicating a *favourable* rating for that element of conservation status assessment. The monitoring stops reflected the high species diversity that was typically found throughout the habitat, with 5 of the stops having over 20 species recorded, including the required numbers from the prescribed typical species list. A number of stops had a negative indicator species element, including one stop that had a combined cover of agricultural grasses and *Senecio jacobaea* (Common ragwort) that exceeded the 5% limit. All other monitoring stops met the required criteria for each attribute target.

Table 119D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Dooyork

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Machair (21A0)	8	0	**Favourable**
Fixed Dunes (H2130)	3	0	**Favourable**

There is no guarantee of the machair plain retaining its status as unenclosed commonage. The consequences of dividing the land into individually owned small fenced strips have been seen throughout the Mullet Peninsula. Therefore, future prospects for the habitat must be considered *unfavourable-inadequate*. The status of the transition zones to saltmarsh, and freshwater or fen vegetation are notable features of the machair and should be included in the indicators of local distinctiveness for the site. Any impacts that threaten their integrity in the future, should be considered as a negative factor in the assessment of habitat future prospects.

A combination of *favourable* and *unfavourable-inadequate* assessments for the individual elements of habitat assessment dictates an overall *unfavourable-inadequate* conservation status assessment.

As the condition of the habitat has probably been stable for some time, yet is threatened by the possibility of an intensification of stock rearing practices, the proposed Irish conservation status assessment thought most appropriate is *unfavourable-unchanged*.

Fixed Dunes (H2130)

The site 6’ map indicates a substantial retreat from previous seaward boundaries. This may have occurred over a long period, and the more recent history of the phenomenon is difficult to assess. However, slumping of vegetation, and the sheer eroded front edge of the dunes in places, indicates

that erosion is ongoing at the site. Nevertheless, this may be principally due to natural processes, and not an indication of damaging anthropogenic activities. The sand dune sites on the Mullet Peninsula are showing signs of sediment depletion (Crawford *et al*., 1996), and this may also be the case on the east side of Blacksod Bay. Doo Lough, across the mouth of a small estuary to the north of Dooyork also appears to have eroded along the seaward edge over the same time, although the recurved tip at the south extreme of the dunes has grown considerably over that time. Because there is no direct evidence of recent habitat loss caused by human interference at Dooyork, habitat extent is considered *favourable*.

The three monitoring stops carried out all passed the target criteria despite a significant amount of bare ground in two of the stops. The high proportion of bare ground throughout the habitat is clearly discernible on the site aerial photograph. Species diversity throughout the habitat is not high, although all three monitoring stops had the requisite number of typical species. Each stop had a negative indicator species component – comprised in each case of *Cirsium arvense* (Creeping thistle) and/or *Senecio jacobaea* (Common ragwort) – although in each case the total cover was well below the maximum limit of 5%. Although a 100% pass rate for monitoring stops would ordinarily indicate a *favourable* structure and functions assessment, the excessive proportion of bare ground suggests that this should be revised. Positioning monitoring stops in places of almost totally bare ground would be largely futile, as all attribute targets would either fail or be irrelevant, due to the lack of vegetation cover. However, account must be taken of the fact that a certain proportion of monitoring stops would fail, were they to be evenly distributed throughout the habitat. For this reason, structure and functions are considered *unfavourable-inadequate*.

The restructuring of open commonage into small fenced fields, has degraded much of the sand dune habitat in the cSAC, particularly that on the Mullet Peninsula. Dooyork has so far avoided this scenario, although there is no guarantee that that will continue to be the case. For this reason, future prospects are *unfavourable-inadequate*.

The overall conservation status assessment is *unfavourable-inadequate*, as the individual elements of the assessment are a combination of *favourable* and *unfavourable-inadequate* judgements.

The corresponding Irish conservation status assessment thought most appropriate is *unfavourable-unchanged*, as the unfavourable aspects of the assessments are not thought to have developed in the very recent past.

Mobile Dunes (H2120)

Mobile dunes at Dooyork consist of only a narrow band, extending around the north tip of the dunes. There are no data to suggest that this represents a recent loss of area, but based on the current poor zonation or distribution of habitat, extent is considered to be *unfavourable-bad*.

Monitoring stops were not carried out in mobile dunes, due to the very limited area of habitat at the site, but a visual assessment of the structure and functions attributes determined an assessment of *unfavourable-bad*: approximately 50% of the area was dominated by *Ammophila arenaria* (Marram) of unhealthy appearance, probably reflecting a lack of mobility in the system.

Despite the absence of any heavily impacting anthropogenic activities or threats to the mobile dunes, the habitat is currently confined to a limited area of the site, and much of the characteristic vegetation is in poor condition. It seems that erosion is preventing the accumulation of significant foredune habitat. The apparent recent trend of erosion at the site suggests that the future prospects for mobile dunes, in the short term at least, are *unfavourable*.

As all three individual conservation status parameters are *unfavourable-bad*, the overall conservation status assessment is also *unfavourable-bad*.

As the poor status of the habitat has probably pertained for some time, the selected Irish conservation status assessment is *unfavourable-unchanged*.

Coastal Monitoring Project 2004-2006

Dooyork

CMP code: 119

0 100 200 300 400 500 Meters

N

Mullet / Blacksod Complex (SAC 470)

This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated areas are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 5953)

Date of production: 25/11/2008
Map version: 1

Original Drawing Size: 297 x 420 (A3)
Scale 1:10776

National Parks and Wildlife Service

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

SITE 120 DOO LOUGH

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

Doo Lough is a large site located 4.7 km northwest of Gweesalia, county Mayo, on the eastern shores of Blacksod Bay. The site forms part of the Mullet/Blacksod Bay Complex SAC (SAC 000470). During the CMP, five Annex I sand dune habitats (* indicates a priority habitat) were recorded here: **2110 Embryonic shifting dunes**, **2120 Marram dunes (white dunes)**, ***2130 Fixed dunes (grey dunes)**, **2190 Humid dune slacks** and ***21A0 Machairs**. Other Annex I habitats linked with the sand dune habitats include **1140 Mudflats and sandflats not covered by seawater at low tide**, **1160 Large shallow inlets and bays**, **1310 Salicornia and other annuals colonizing mud and sand**, **7230 Alkaline fens**. **2150 Atlantic decalcified fixed dunes (Calluno-Ulicetea)** is found within the SAC, but was not found at the site during the CMP or the SDM. The Annex II rare liverwort species, *Petalophyllum ralfsii* (Petalwort), has been recorded from Doo Lough in the past, but was not found during the CMP or the SDM.

The ***21A0 Machairs** at Doo Lough are in private ownership and the main land use is as pasture for sheep and cattle. About 20 cattle were present on the main unfenced part of the machair plain when it was surveyed in 2011. Sheep were grazing in fields in the northwest of the site. The ***2130 Fixed dunes (grey dunes)** habitat is in NPWS ownership and fencing prevents casual access by cattle.

2 CONSERVATION ASSESSMENTS

2.1 Overview

Dog's Bay was surveyed from the 16th to the 19th of August 2011. Conservation assessments were carried out for seven habitats, three more than were assessed during the CMP. No trends could be established for **1210 Annual vegetation of drift lines**, **1220 Perennial vegetation of stony banks** or **2110 Embryonic shifting dunes** as they had not been assessed during the CMP. All of the habitats assessed and the results of the conservation assessments are presented in Table 1**. 1220 Perennial vegetation of stony banks** and ***21A0 Machairs** were assessed as Unfavourable-Inadequate, while the remaining habitats were assessed as

Favourable. Three habitats, **2120 Marram dunes (white dunes)**, ***2130 Fixed dunes (grey dunes)** and **2190 Humid dune slacks** show signs of improvement since the CMP, while ***21A0 Machairs** have deteriorated. The main factors contributing to the Unfavourable-Inadequate assessments were sea defences and agricultural improvement.

Table 1. Conservation assessment results for all Annex I dune habitats surveyed at Doo Lough, Co. Mayo.

Habitat	Area	Structure & Functions	Future Prospects	Overall result
1210 Annual vegetation of drift lines	Favourable	Favourable	Favourable	Favourable
1220 Perennial vegetation of stony banks	Favourable	Unfavourable-Inadequate	Unfavourable-Inadequate	Unfavourable-Inadequate
2110 Embryonic shifting dunes	Favourable	Favourable	Favourable	Favourable
2120 Marram dunes (white dunes)	Favourable (stable)	Favourable (stable)	Favourable (improving)	Favourable (improving)
*2130 Fixed dunes (grey dunes)	Favourable (improving)	Favourable (improving)	Favourable (improving)	Favourable (improving)
2190 Humid dune slacks	Favourable (stable)	Favourable (stable)	Favourable (improving)	Favourable (improving)
*21A0 Machairs	Favourable (stable)	Unfavourable-Inadequate (deteriorating)	Unfavourable-Inadequate (stable)	Unfavourable-Inadequate (deteriorating)

2.1.1 Area

Modifications were made to the habitats as mapped on the baseline maps due to changes in the interpretation of the habitats. The area of ***21A0 Machairs** in the north-western part of the site was increased at the expense of ***2130 Fixed dunes (grey dunes)**, while part of the site previously mapped as ***21A0 Machairs** in the east was considered to be more appropriately classified as a peatland habitat. There has been an increase in the total area of Annex I sand dune habitats at Doo Lough, and this is due to accretion and succession of fore-dune habitats.

Table 2. Areas of Annex I habitats originally mapped at Doo Lough during the baseline survey (Coastal Monitoring Project), the revised baseline areas and areas mapped during the Sand Dune Monitoring Project in 2011/2012.

Habitat	Baseline survey (ha)	Revised baseline (ha)	Sand Dunes Monitoring Project (ha)
1210 Annual vegetation of drift lines	0.00	0.00	0.23
1220 Perennial vegetation of stony banks	0.00	0.00	0.42
2110 Embryonic shifting dunes	<0.01	<0.01	2.53
2120 Marram dunes (white dunes)	4.60	4.60	3.56
*2130 Fixed dunes (grey dunes)	53.72	44.63	46.35
2190 Humid dune slacks	1.56	1.56	0.54
*21A0 Machairs	58.43	63.40	63.19
Totals	118.32	114.20	116.82

2.1.2 *Structure and Functions*

Structure and Functions were assessed for all seven of the Annex I sand dune habitats at Doo Lough. Table 3 shows the results of the Structure and Functions assessment. All of the criteria passes for five habitats: **1210 Annual vegetation of drift lines**, **2110 Embryonic shifting dunes**, **2120 Marram dunes (white dunes)**, ***2130 Fixed dunes (grey dunes)** and **2190 Humid dune slacks**. The criterion assessing intervention in the sediment dynamics failed for **1220 Perennial vegetation of stony banks** while negative indicator species caused one criterion to fail for ***21A0 Machairs**.

Table 3. Annex I Habitats at Doo Lough for which Structure and Functions were assessed, with the number of monitoring stops, assessment criteria and the number of criteria that failed.

Habitat	No. monitoring stops	Total no. assessment criteria	No. failed criteria
1210 Annual vegetation of drift lines	2	6	0
1220 Perennial vegetation of stony banks	2	6	1
2110 Embryonic shifting dunes	4	7	0
2120 Marram dunes (white dunes)	4	7	0
*2130 Fixed dunes (grey dunes)	8	11	0
2190 Humid dune slacks	2	11	0
*21A0 Machairs	8	10	1

2.1.3 *Future Prospects*

Impacts and activities recorded at Doo Lough are presented in Table 4. Impact codes are assigned according to Ssymanck (2010). The impacts that affect the sand dune habitats at Doo Lough were generally related to agriculture, although there were some signs of recreational use.

Table 4. Impacts recorded in Annex I sand dune habitats at Doo Lough in 2011/2012. Source refers to whether the impact being scored originates inside or outside the Annex I habitat being assessed.

Habitat code	Impact code	Impact description	Intensity	Effect	Percent of habitat	Source
1210	J02.12.01	Sea wall	Medium	Neutral	20	Outside
1220	J02.12.01	Sea wall	Medium	Negative	20	Outside
2110	J02.12.01	Sea wall	-	Neutral	0	Outside
2120	J02.12.01	Sea wall	-	Neutral	0	Outside
*2130	A04.02.01	Non intensive cattle grazing	Low	Positive	5	Inside
*2130	G01.02	Walking	Low	Positive	5	Inside
*2130	G05.09	Fencing	Low	Neutral	1	Inside
*2130	J02.12.01	Sea wall	-	Neutral	0	Outside
2190	J02.12.01	Sea wall	-	Neutral	0	Outside
2190	K01.03	Drying out	Medium	Neutral	50	Inside
*21A0	A02.01	Agricultural intensification	Medium	Negative	10	Inside
*21A0	A04.02.01	Non intensive cattle grazing	Medium	Positive	95	Inside
*21A0	A04.03	Lack of grazing	Medium	Neutral	5	Inside
*21A0	A05.02	Stock feeding (cattle)	High	Negative	1	Inside
*21A0	D01.01	Paths and tracks	Low	Negative	1	Inside
*21A0	G01.02	Walking	Low	Neutral	10	Inside
*21A0	G01.03.02	Off-road driving	Medium	Negative	1	Inside
*21A0	G05.09	Fencing	Low	Neutral	1	Inside
*21A0	J02.12.01	Sea wall	-	Neutral	0	Outside

2.2 Annex I habitat assessments

The conservation status of the Annex I habitats at Doo Lough is discussed below. The present conservation status in 2011/2012 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 2011/2012 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

There has been some erosion of the ***21A0 Machairs** in the northern part of the beach since the baseline survey. The exposed sand has begun the process of recovery, with fore-dune habitats forming in the area previously occupied by ***21A0 Machairs**. A narrow strip of **1210 Annual vegetation of drift lines** was

present here. The habitat was not found at Doo Lough during the CMP, and no assessment was carried out on it.

Area

1210 Annual vegetation of drift lines occupied an area of 0.23 ha at Doo Lough. There was no sign of habitat destruction or failure of the habitat to develop due to human activities, and Area was assessed as Favourable.

Structure and Functions

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

Future Prospects

Coastal defences were noted as a neutral impact at Doo Lough as there were no clear signs that they were affecting the habitat in 2011. No negative impacts were recorded. Future Prospects were assessed as Favourable.

Conservation assessment

All three parameters were assessed as Favourable, and the conservation status of **1210 Annual vegetation of drift lines** at Doo Lough was Favourable.

2.2.2 1220 Perennial vegetation of stony banks

1220 Perennial vegetation of stony banks were located close to the **1210 Annual vegetation of drift lines** in the north the site. The habitat was not recorded at Doo Lough during the CMP.

Area

There was 0.42 ha of **1220 Perennial vegetation of stony banks** present at Doo Lough. There was no indication that the area of the habitat had been affected by human activities. Area was assessed as Favourable.

Structure and Functions

All of the criteria passed in the Structure and Functions assessment with the exception of the criterion assessing interference with the sediment dynamics. The construction of a sea wall protecting the newly-built car park had caused an alteration to the sediment availability and wave energy dynamics. There were two polygons of **1220 Perennial vegetation of stony banks** present at Doo Lough. The northern polygon was closer to the car park, and this was the area exposed to the effects of the sea wall. Structure and Functions were assessed as Unfavourable-Inadequate.

Future Prospects

The only impact recorded was coastal defences. The sea wall had a medium-intensity negative effect on 20% of the habitat. Future Prospects were assessed as Unfavourable-Inadequate.

Conservation assessment

Area was assessed as Favourable while Structure and Functions and Future Prospects were assessed as Unfavourable-Inadequate. The conservation status of **1220 Perennial vegetation of stony banks** at Doo Lough was assessed as Unfavourable-Inadequate.

2.2.3 2110 Embryonic shifting dunes

This habitat occurs in the active, south western part of the sand dunes and where the dunes give way to saltmarsh. The habitat was not assessed during the CMP because it occupied a very small area at that time.

Area

This habitat had expanded from less than 0.01 ha during the CMP to 2.53 ha during the SDM. There was no indication of habitat loss due to human activities. Area was assessed as Favourable.

Structure and Functions

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

Future Prospects

No impacts were recorded from this habitat in 2011 and Future Prospects were assessed as Favourable.

Conservation assessment

Because all of the parameters were assessed as Favourable, The conservation status of **2110 Embryonic shifting dunes** at Doo Lough was assessed as Favourable.

3.2.4 2120 Marram dunes (white dunes)

2120 Marram dunes (white dunes) were found on the accreting south-western coast of Doo Lough as well as in a small patch inside the sheltered bay. The habitat benefits from the availability of blown sand and is relatively undisturbed.

Area

The area of **2120 Marram dunes (white dunes)** decreased slightly from 4.60 ha during the CMP to 3.56 ha during the SDM. The loss was due to natural cycles of erosion and deposition. During the CMP, Area was assessed as Favourable. Area was assessed as Favourable (stable) during the SDM.

Structure and Functions

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

Future Prospects

During the CMP, **Future Prospects** were assessed as Unfavourable-Inadequate because cattle had access to the habitat and had caused damage. The only impact listed for the habitat during the SDM was coastal protection, and this was a neutral impact. There was no evidence of damage by cattle during the SDM and Future Prospects were assessed as Favourable (improving).

Conservation assessment

All three parameters were assessed as Favourable during the SDM. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate while the other two parameters were assessed as Favourable. The

conservation status of **2120 Marram dunes (white dunes)** was assessed as Favourable (improving) during the SDM.

*2.2.5 *2130 Fixed dunes (grey dunes)*

Well-developed fixed dune ridges in the south of Doo Lough support ***2130 Fixed dunes (grey dunes)**. This part of the site is lightly grazed and supports a species rich sward with the typical *Festuca rubra*, *Galium verum* and *Trifolium repens* community. *Campanula rotundifolia* is notably frequent within this habitat at Doo Lough.

Area

The area of ***2130 Fixed dunes (grey dunes)** increased from 44.63 ha during the CMP to 46.35 ha during the SDM. This was due to dune building in the south-western part of the site. There was no indication of habitat loss due to human activities. During the CMP, Area was assessed as Unfavourable-Inadequate because trampling by livestock had caused some erosion at the edge of the ***2130 Fixed dunes (grey dunes)**. Area was assessed as Favourable (improving) during the SDM.

Structure and Functions

All of the criteria passed in the Structure and Functions assessment. During the CMP, one monitoring stop in the south of the site failed because the vegetation was rank and species poor, and Structure and Functions were assessed as Unfavourable-Inadequate. However, the vegetation was generally species rich in 2011, and undergrazing was not observed. Structure and Functions were assessed as Favourable (improving) during the SDM.

Future Prospects

No negative impacts were recorded from ***2130 Fixed dunes (grey dunes)** in 2012. Cattle grazing and walking are recorded as positive impacts as they prevent the vegetation from becoming rank and the light trampling adds to the structural diversity of the habitat without causing damage. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate because cattle were gaining access to the habitat and causing damage. Negative impacts recorded included agricultural improvements, overgrazing by cattle, supplementary feeding and driving on the dunes. Some of the negative agricultural impacts may have been associated with parts of the site which were reclassified as ***21A0 Machairs** during the SDM. Fencing around the ***2130 Fixed dunes (grey dunes)** was reinforced after the CMP and Future Prospects were assessed as Favourable (improving) during the SDM.

Conservation assessment

All three of the parameters were assessed as Favourable. During the CMP, all three of the parameters were assessed as Unfavourable-Inadequate. The conservation status of ***2130 Fixed dunes (grey dunes)** at Doo Lough was assessed as Favourable (improving) during the SDM.

2.2.9 2190 Humid dune slacks

Although the **2190 Humid dune slacks** are small, they contain a well-developed dune slack flora. Species indicative of damp conditions include *Mentha aquatica*, *Hydrocotyle vulgaris*, *Cardamine pratensis* and *Galium palustris*.

Area

The area of **2190 Humid dune slacks** decreased from 1.56 ha during the CMP to 0.54 ha during the SDM. Although this is a considerable reduction in area, there is no indication that the loss is due to anthropogenic factors. Two of the dune slacks mapped during the CMP appeared to have dried out and contained species similar to the surrounding ***2130 Fixed dunes (grey dunes)** in 2011. A monitoring stop located in one of the slacks was described as mature and drying during the CMP. No stop was recorded from the larger of the two slacks. Dune slacks tend to dry out over time, and may be affected by deposition of windblown sand which raises the level of the substrate above the influence of groundwater. There is no evidence that water abstraction is occurring at Doo Lough. During the CMP, Area was assessed as Favourable. Because the reduction in the area of **2190 Humid dune slacks** appears to be natural and not due to human activities, Area was assessed as Favourable (stable) during the SDM.

Structure and Functions

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

Future Prospects

No negative impacts were recorded from the dune slacks. One of the remaining slacks shows signs of drying out and has decreased in size since the baseline survey, but this is considered to be a natural progression and was recorded as a neutral impact. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate because of damage and overgrazing by cattle although no impacts were listed for the habitat. Future Prospects were assessed as Favourable (improving) during the SDM.

Conservation assessment

All parts of the assessment were assessed as Favourable during the SDM. During the CMP, Area and Structure and Functions were assessed as Favourable, while Future Prospects were assessed as Unfavourable-Inadequate. The conservation status of **2190 Humid dune slacks** at Doo Lough was assessed as Favourable (improving) during the SDM.

*2.2.10 *21A0 Machairs*

The ***21A0 Machairs** habitat is generally in good condition and shows little indication of alteration, with the exception of the fenced part of the habitat in the north of the site and the area closest to the access point for the adjacent farm, where *Senecio jacobaea* is frequent. The habitat grades into peatlands and salt marsh in the east, and there is a transitional area with a fen-type community. *Gentianella campestris* was abundant in the ***21A0 Machairs**.

Area

The area of ***21A0 Machairs** decreased from 63.40 ha during the CMP to 63.19 ha during the SDM. This was due to erosion in the northern part of the site. Although there has been some alteration of the sediment dynamics in the north of the site, a pattern of erosion in this area is evident in the aerial photographs and six inch map of Doo Lough, so the loss of area was not considered to be directly associated with the new sea

wall. Area was assessed as Favourable during the CMP. During the SDM, Area was assessed as Favourable (stable).

Structure and Functions

One of the criteria failed during the Structure and Functions assessment. The negative indicator species *Lolium perenne* was above the threshold for a fail in monitoring stop 1. This area showed signs of having been subjected to agricultural improvement in the past. During the CMP, Structure and Functions were assessed as Favourable. Structure and Functions were assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Future Prospects

Negative impacts recorded at Doo Lough included agricultural intensification, supplementary feeding, driving on the habitat and tracks. There was a lack of grazing in part of the habitat, but this had not resulted in rank vegetation or lack of diversity and was recorded as a neutral impact. Walking was also recorded as a neutral impact as the intensity was low. Grazing has a positive impact and affects 95% of the habitat. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate. Negative impacts included discharges (septic tank), driving on the habitat and agricultural improvement. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Conservation assessment

Area was assessed as Favourable, while Structure and Functions and Future Prospects were assessed as Unfavourable-Inadequate. During the CMP, Area and Structure and Functions were assessed as Favourable and Future Prospects were assessed as Unfavourable-Inadequate. The Conservation status of ***21A0 Machairs** at Doo Lough was assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

3 Discussion

3.1 Agriculture

The agricultural regime is generally appropriate at Doo Lough. Although the recommended management for ***21A0 Machairs** in Ireland is winter grazing by cattle (Cooper *et al*., 2005), the current level of stocking has not resulted in a tightly cropped sward or allowed the vegetation to become rank. The locally elevated cover of *Lolium perenne* in the ***21A0 Machairs** indicates that an agricultural grass seed mix was probably applied in the past, but there were no signs of recent application. Reseeding with agricultural grass species is detrimental to diversity in sand dune habitats, and is often carried out as part of a suite of agricultural improvement measures including fertilisation. If no further reseeding or fertilisation takes place, the influence of this type of intensive management is likely to diminish over time.

3.2 Conservation

Management of the ***2130 Fixed dunes (grey dunes)** by NPWS has resulted in well-preserved dune vegetation with no obvious structural damage. Walkers use the dunes, but not in sufficient numbers to cause damage. No signs of grazing were present in 2011, but there were no indications that the habitat was becoming rank.

3.3 Sea wall

The construction of a sea wall associated with a new car park adjacent to the site may result in changes to the sediment dynamics of the fore-dunes nearby. The potential effects on the geomorphology of the site will become clearer over time as more monitoring and mapping are carried out.

4 REFERENCES

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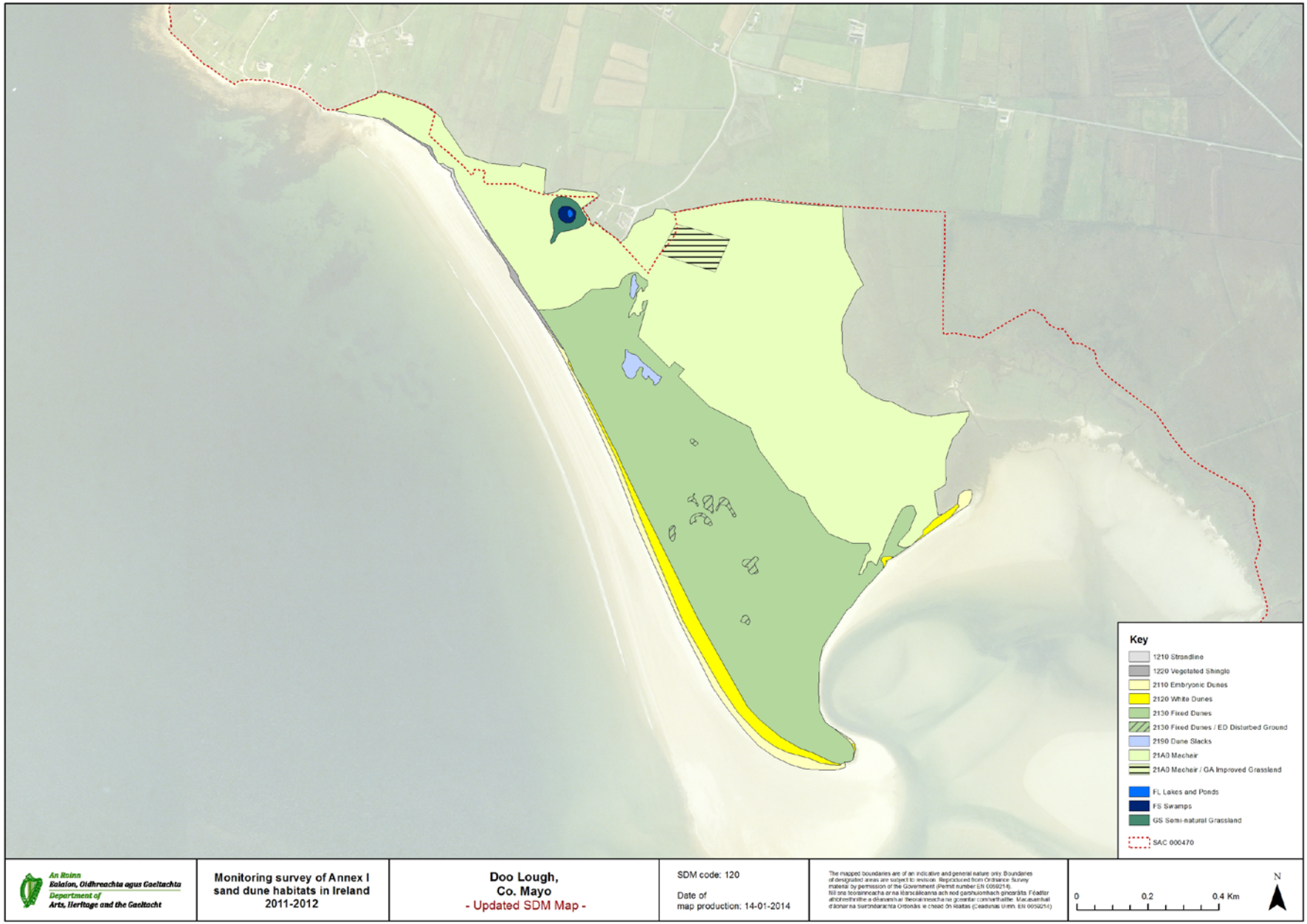
An Roinn Ealaíon, Oidhreachta agus Gaeltachta Department of Arts, Heritage and the Gaeltacht	Monitoring survey of Annex I sand dune habitats in Ireland 2011-2012	Doo Lough, Co. Mayo -Revised Baseline Habitat Map-	SDM code: 120 Date of map production: 14-01-2014	The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government (Permit number EN 0059214). Níl sna teorainneacha ar na léarscáileanna ach nod garbhuíomhach ginearálta. Féadfar athbhreithnithe a dhéanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas (Ceadúnas Uimh. EN 0059214)	0 0.2 0.4 Km N


Key
1210 Strandline
1220 Vegetated Shingle
2110 Embryonic Dunes
2120 White Dunes
2130 Fixed Dunes
2130 Fixed Dunes / ED Disturbed Ground
2190 Dune Slacks
21A0 Macheir
21A0 Macheir / GA Improved Grassland
FL Lakes and Ponds
FS Swamps
GS Semi-natural Grassland
SAC 000470
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
Monitoring survey of Annex I sand dune habitats in Ireland 2011-2012
Doo Lough, Co. Mayo
- Updated SDM Map -
SDM code: 120
Date of map production: 14-01-2014
0 0.2 0.4 Km
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Appendix XI – Aghleam site report and habitat maps from the Sand Dunes Monitoring Project (Delaney *et al*., 2013).

SITE 124 AGHLEAM

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

Aghleam is a large site situated on the south-western tip of the Mullet Peninsula, approximately 12 km south-west of Belmullet, Co. Mayo. It comprises two sand dune systems separated by a small headland in the west of the site and a local road. The larger sand dune system runs along the west coast of the Mullet Peninsula from Tiraun Point to Letterbeg, while the smaller sand dune system is found at the southern tip of the peninsula at Portmore. The site forms part of the Mullet/Blacksod Bay Complex (SAC 000470). Seven Annex I sand dune habitats (* indicates a priority habitat) were recorded during the CMP: **2110 Embryonic shifting dunes, 2120 Marram dunes (white dunes), *2130 Fixed dunes (grey dunes), *2150 Decalcified dune heath, 2170 Dunes with creeping willow, 2190 Humid dune slacks** and ***21A0 Machairs** (Ryle *et al*., 2009). Other Annex I habitats associated with the sand dunes at Aghleam include **1140 Mudflats and sandflats not covered by seawater at low tide, 1160 Large shallow inlets and bays, 1170 Reefs** and **1310 *Salicornia* and other annuals colonising mud and sand**. The Annex V species the Irish hare (*Lepus timidus hibernicus*) and Common Frog (*Rana temporaria*) were observed on site during the SDM, as was the Eurasian badger (*Meles meles*) which is protected under the 1976 Wildlife Act and Wildlife (Amendment) Act 2000. The main land-use for the site is for agricultural purposes, particularly in the western section of the site, and to a lesser extent, it is used for recreation.

2 CONSERVATION ASSESSMENTS

2.1 Overview

Aghleam was surveyed from the 25th to the 28th of June 2012. Of the seven habitats recorded on the site during the baseline survey, all were recorded again during the SDM. Two additional habitats, **1210 Annual vegetation of drift lines** and **1220 Perennial vegetation of stony banks** were also recorded during the SDM. The habitats found at Aghleam in 2012 and the results of the conservation assessments are presented in Table 1. **1210 Annual vegetation of drift lines** and **1220 Perennial vegetation of stony banks** were below the minimum monitoring area and were therefore not assessed. Any ***2150 Decalcified dune heath** located during the survey was mapped, but no conservation assessment of that habitat was carried out as part of this

survey. Of the other habitats, **2110 Embryonic shifting dunes** and **2120 Marram dunes (white dunes)** were assessed as Favourable and ***2130 Fixed dunes (grey dunes), 2170 Dunes with creeping willow, 2190 Humid dune slacks** and ***21A0 Machairs** were assessed as Unfavourable-Inadequate.

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

Habitat	Area	Structure & Functions	Future Prospects	Overall result
2110 Embryonic shifting dunes	Favourable (Stable)	Favourable (Stable)	Favourable (Stable)	Favourable (Stable)
2120 Marram dunes (white dunes)	Favourable (Stable)	Favourable (Stable)	Favourable (Stable)	Favourable (Stable)
*2130 Fixed dunes (grey dunes)	Favourable (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)
2170 Dunes with creeping willow	Favourable (Stable)	Unfavourable-Inadequate (Deteriorating)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Deteriorating)
2190 Humid dune slacks	Favourable (Stable)	Unfavourable-Inadequate (Deteriorating)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Deteriorating)
*21A0 Machairs	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)	Unfavourable-Inadequate (Stable)

2.1.1 Area

The areas of Annex I sand dune habitats at Aghleam are presented in Table 1. The areas of ***2130 Fixed dunes (grey dunes)** and ***21A0 Machairs** mapped during the baseline survey were revised after the site was visited in 2012 due to a difference in the interpretation of the habitats. The ***21A0 Machairs** habitat was extended into part of the site formerly mapped as ***2130 Fixed dunes (grey dunes)**. The baseline boundaries of **2190 Humid dune slacks** and **2170 Dunes with creeping willow** were amended as part of the more detailed mapping methodology in 2011, and several new areas of those habitats were identified within the ***2130 Fixed dunes (grey dunes)**. The baseline area of ***2150 Decalcified dune heath** was amended as part of the heath was found to be on very shallow sand over siliceous rock. Although some of the heath was retained as ***2150 Decalcified dune heath**, further investigation is required to determine whether the substrate is truly decalcified or if the acidic rock underlying the habitat has influenced the vegetation. Small areas of **1210 Annual vegetation of drift lines** and **1220 Perennial vegetation of stony banks**, previously unrecorded during the baseline survey, were recorded during the SDM. In total, 294.42 ha of ***2130 Fixed dunes (grey dunes)** was recorded. This figure includes a field of 7.40 ha in size which could not be accessed and was marked as "Not surveyed" in the GIS project. An area of 3.02 ha mapped as "other" during the CMP was viewed and was considered likely to contain built land and ***21A0 Machair,** but this was not included within the area for assessment and is not included in the area shown in Table 2. The total area of Annex I sand dune habitats at Aghleam was slightly greater in 2012 than it had been during the baseline survey, and this was due to a small amount of accretion and succession.

Table 2. Areas of Annex I dune habitats mapped at Aghleam 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	0.00	0.00	0.06
1220 Perennial vegetation of stony banks	0.00	0.00	0.03
2110 Embryonic shifting dunes	1.48	1.48	0.92
2120 Marram dunes (white dunes)	5.13	5.13	3.85
*2130 Fixed dunes (grey dunes)	318.69	292.78	294.42
*2150 Decalcified dune heath	7.67	1.91	4.09
2170 Dunes with creeping willow	27.49	39.43	39.43
2190 Humid dune slacks	19.82	24.94	24.85
*21A0 Machairs	142.05	152.17	151.98
Total	522.33	517.84	519.63

2.1.2 Structure and Functions

Structure and Functions were assessed for six of the nine Annex I sand dune habitats mapped at Aghleam. Table 3 shows the results of the Structure and Functions assessment. **1210 Annual vegetation of drift lines** and **1220 Perennial vegetation of stony banks** were not assessed as they were believed to be below the minimum monitoring area at the time of the field survey. After the habitats were digitised, it was shown that **1210 Annual vegetation of drift lines** was larger than had been estimated in the field. ***2150 Decalcified dune heath** was not assessed as part of this project. The Structure and Functions of **2110 Embryonic shifting dunes** and **2120 Marram dunes (white dunes)** were assessed as Favourable, with all assessment criteria passing. The remaining habitats were assessed as Unfavourable-Inadequate, with each having one or two criteria failing.

Table 3. Annex I sand dune habitats at Aghleam 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	8	7	0
2120 Marram dunes (white dunes)	8	7	0
*2130 Fixed dunes (grey dunes)	16	11	2
2170 Dunes with creeping willow	12	10	1
2190 Humid dune slacks	8	11	1
*21A0 Machairs	16	10	2

2.1.3 Future Prospects

Impacts and activities recorded at Aghleam are presented in Table 4. Impact codes are assigned according to Ssymanck (2010). **1210 Annual vegetation of drift lines, 1220 Perennial vegetation of stony banks** and ***2150 Decalcified dune heath** had no impacts recorded during the SDM. ***2130 Fixed dunes (grey dunes)** had the most negative impacts of any Annex I sand dune habitat on the site. Grazing, either mixed with

cattle and donkey grazing or cattle only, tended to have a positive effect on the habitats it occurred in. Frequently occurring negative impacts for the site included the supplementary feeding, garden plants, off-road driving, use of fertiliser and storage of bales and dumping on the site.

Table 4. Impacts recorded in Annex I sand dune habitats at Aghleam 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	Intensity	Effect	Percent of habitat	Source
1210	X	No impacts	-	-	100	-
1220	X	No impacts	-	-	100	-
2110	G01.02	Walking	Low	Neutral	1	Inside
2120	A04.02.01	Non intensive cattle grazing	Low	Neutral	5	Inside
2120	G01.02	Walking	Low	Neutral	1	Inside
2120	G01.03.02	Off-road driving	Medium	Negative	1	Inside
2120	G05.09	Fencing	Medium	Neutral	1	Inside
2120	I01	Garden plants	Low	Negative	1	Inside
2120	J03.03	Dune stabilisation using brash	Medium	Positive	1	Inside
*2130	A02.01	Reseeding	Low	Negative	40	Inside
*2130	A04.02.01	Non intensive cattle grazing	Medium	Positive	95	Inside
*2130	A04.02.03	Non intensive horse grazing	Low	Positive	1	Inside
*2130	A04.03	Undergrazing	Medium	Neutral	5	Inside
*2130	A05.02	Supplementary feeding	High	Negative	5	Inside
*2130	A08	Fertiliser (organic and inorganic)	Medium	Negative	10	Inside
*2130	E05	Storage of silage bales	High	Negative	1	Inside
*2130	G01.03.02	Off-road driving	Low	Negative	1	Inside
*2130	G02.07	Sports pitch	Low	Negative	1	Inside
*2130	G05.09	Fencing	Medium	Neutral	1	Inside
*2130	H05.01	Dumping	High	Negative	1	Inside
*2130	I01	Garden plants	Medium	Negative	1	Inside
*2130	J02.02	Sand extraction	High	Negative	1	Inside
*2130	J03.03	Stabilisation work	Medium	Negative	1	Inside
*2150	X	No impacts	-	-	100	-
2170	A04.02.01	Non intensive cattle grazing	Low	Positive	25	Inside
2170	A04.02.05	Non intensive mixed grazing	Low	Positive	65	inside
2170	A04.03	Undergrazing	Medium	Negative	10	Inside
2170	G05.09	Fencing	Medium	Neutral	1	Inside
2190	A04.02.01	Non intensive cattle grazing	Low	Positive	70	Inside
2190	A04.02.05	Non intensive mixed grazing	Low	Positive	30	Inside
2190	A05.02	Supplementary feeding	High	Negative	1	Inside
2190	G01.03.02	Off-road driving	Low	Negative	1	Inside
2190	H05.01	Dumping silage bales	High	Negative	1	Inside
2190	J02.05.03	Water scrapes	High	Negative	1	Inside
*21A0	A02.01	Reseeding	Medium	Negative	10	Inside
*21A0	A04.02.01	Non intensive cattle grazing	Low	Positive	100	Inside
*21A0	A05.02	Supplementary feeding	High	Negative	1	Inside
*21A0	A08	Fertiliser (unknown)	Low	Negative	30	Inside

*21A0	C01	Quarrying	High	Negative	1	Outside
*21A0	G01.03.02	Off-road driving	Low	Negative	1	Inside
*21A0	G05	Bonfires and burning rubbish	High	Negative	1	Inside
*21A0	G05.09	Fencing	Medium	Neutral	1	Inside
*21A0	H05.01	Dumping	High	Negative	1	Inside

2.2 Annex I habitat assessments

The conservation status of the Annex I habitats at Aghleam 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 noted that natural processes such as erosion, deposition and succession are primary drivers of change on coastal habitats.

2.2.1 1210 Annual vegetation of drift lines

1210 Annual vegetation of drift lines was not recorded during the baseline survey. Three small areas of this habitat were mapped in 2012 along the west coast, however at the time of the survey the total area was thought to be below the minimum monitoring area and the habitat's conservation status was not assessed. No impacts were recorded for this habitat during the SDM.

2.2.2 1220 Perennial vegetation of stony banks

1220 Perennial vegetation of stony banks was not recorded during the baseline survey. A small area of this habitat was mapped in the north of the site in 2012 but it was below the minimum monitoring area and its conservation status was therefore not assessed. No impacts were recorded for this habitat during the SDM.

2.2.3 2110 Embryonic shifting dunes

2110 Embryonic shifting dunes are found as small, fragmented patches along the coast at Aghleam.

Area

The area of **2110 Embryonic shifting dunes** has decreased from 1.48 ha during the baseline survey to 0.92 ha during the SDM. This loss is due to natural processes of erosion and succession, and there is no evidence of anthropogenic loss. Area was assessed as Favourable during the CMP. During the SDM, Area was assessed as Favourable (stable).

Structure and Function

2110 Embryonic shifting dunes are in good condition at Aghleam. Eight stops were assessed and all criteria passed in the Structure and Functions assessment. During the CMP, Structure and Functions were assessed as Favourable. Structure and Functions were assessed as Favourable (stable) during the SDM.

Future Prospects

The only impact recorded was walking which had a low intensity neutral effect on 1% of the habitat. During the CMP, Future Prospects were assessed as Favourable. Future Prospects were assessed as Favourable (stable) during the SDM.

Overall conservation assessment

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

2.2.4 2120 Marram dunes (white dunes)

2120 Marram dunes (white dunes) are found on the western coast of Aghleam and are much less fragmented than **2110 Embryonic shifting dunes.**

Area

2120 Marram dunes (white dunes) have decreased in area from 5.13 to 3.85 ha since the baseline survey. This is mainly due to natural succession and there was no sign of anthropogenic loss. During the CMP, Area was assessed as Favourable. Area was assessed as Favourable (stable) during the SDM.

Structure and Function

All of the criteria passed in the Structure and Functions assessment. A non-native species has been introduced at one location but the number of plants is very small and they do not appear to be invasive at present. Structure and Functions were assessed as Favourable during the CMP. During the SDM, Structure and Functions were assessed as Favourable (stable).

Future Prospects

Cattle grazing, fencing and walking were recorded as neutral impacts at Aghleam. Planting of garden plants had a low intensity negative effect on less than 1% of the site, while sand trapping using brash had a medium-intensity positive effect on 1% of the **2120 Marram dunes (white dunes).** This is considered positive as it complements natural processes and is used where there is evidence of some anthropogenic disturbance. Off-road driving has a medium-intensity negative impact on under 1% of the habitat. During the CMP, Future Prospects were assessed as Favourable. Because the introduced plants appear not to have become well-established and locals appear to be vigilant in combating damage to the structure of the **2120 Marram dunes (white dunes)**, Future Prospects were assessed as Favourable (stable).

Overall conservation assessment

All three parameters were assessed as Favourable during the SDM. They were also assessed as Favourable during the CMP. The conservation status of **2120 Marram dunes (white dunes)** was assessed as Favourable (stable) during the SDM.

*2.2.5 *2130 Fixed dunes (grey dunes)*

***2130 Fixed dunes (grey dunes)** are the most extensive habitat at Aghleam. The majority of the habitat is found on the western side of the site and it runs back towards the centre of the Mullet Peninsula.

Area

The area of ***2130 Fixed dunes (grey dunes)** has increased from 292.78 ha during the CMP to 294.42 ha during the SDM. This is due to succession from **2120 Marram dunes (white dunes)**. There is no indication of loss due to human activity. During the CMP, Area was assessed as Unfavourable-Inadequate because of agricultural activities. The 1995 aerial photographs appear to indicate that the field boundaries, which coincide with the boundaries of the SAC, were well-established prior to the implementation of the Habitats Directive in 1997. There has not been any loss of ***2130 Fixed dunes (grey dunes)** within the SAC boundaries in the interim. Although there have clearly been losses from outside of the SAC, these occurred prior to designation and are not considered within the monitoring methodology. Area would almost certainly have been assessed as Favourable under the current methodology. Area was assessed as Favourable (stable) during the SDM.

Structure and Function

Sixteen monitoring stops were recorded in ***2130 Fixed dunes (grey dunes)** at Aghleam. The condition of the habitat was very variable, and two of the criteria failed in the Structure and Functions assessment. Part of the habitat was badly affected by negative indicator species associated with agriculture such as *Lolium perenne*, and disturbance associated with stock feeding was recorded in almost every field in the northern part of the habitat. During the CMP, Structure and Functions were assessed as Unfavourable-Inadequate as a result of agricultural improvement and undergrazing. Structure and Functions were assessed as Unfavourable-Inadequate (stable) during the SDM.

Future Prospects

The most significant impact recorded at the habitat is cattle grazing, which has a medium-intensity positive impact on 95% of the habitat. Ten negative impacts were recorded. Stabilisation works, sand extraction, planting of garden plants, dumping and silage bale storage all had either a high or medium intensity effect on up to 1% of the habitat, and a sports pitch and off-road driving both had a low-intensity negative impact on 1% of the habitat. Reseeding had a low negative impact on 40% of the habitat, fertiliser had a medium negative impact on 10% of the habitat and supplementary feeding had a high negative impact on 5% of the habitat. During the CMP, agricultural improvement, supplementary feeding, fencing, overgrazing, agricultural structures, human habitation, a sports pitch, motorised vehicles and trampling were recorded as negative impacts. Future Prospects were assessed as Unfavourable-Inadequate during the CMP. During the SDM, Future Prospects were assessed as Unfavourable-Inadequate (stable).

Overall conservation assessment

Although Area was assessed as Favourable, Structure and Functions and Future prospects were assessed as Unfavourable-Inadequate. During the CMP, all three parameters were assessed as Unfavourable-Inadequate, but Area would have been assessed as Favourable under the current methodology. The conservation status of ***2130 Fixed dunes (grey dunes)** was assessed as Unfavourable-Inadequate (stable) during the SDM.

*2.2.6 *2150 Decalcified dune heath*

The heath at Aghleam may be influenced by the underlying rock as opposed to decalcified sand, and this should be investigated as it may be reclassified as **4030 European dry heath**. The Structure and Functions of this habitat were not assessed as part of the SDM. There was no indication of a loss of area related to human activities, and no negative impacts were recorded. The habitat was managed as unfenced pasture during the SDM.

2.2.7 2170 Dunes with creeping willow

Aghleam contains the second largest area of this habitat recorded during the SDM. It is found in the central portion of the site in the Newtown and Aghleam townlands. South of the track running to the coast, the habitat is found in isolated patches in a mosaic with **2190 Humid dune slacks** and ***2130 Fixed dunes (grey dunes)**. North of the track, the habitat dominates an area of over 20 ha, and is punctuated by **2190 Humid dune slacks.**

Area

The area of **2170 Dunes with creeping willow** remained stable at 39.43 ha. There is no indication of change due to human activities. During the CMP, Area was assessed as Favourable. During the SDM, Area was assessed as Favourable (stable).

Structure and Function

A single criterion failed in the Structure and Functions assessment. At monitoring stop 9, the *Salix repens* was tall and bushy due to undergrazing. During the CMP, the habitat was assessed as Favourable. Structure and Functions were assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Future Prospects

Almost the entire habitat is grazed by cattle with occasional donkey grazing. This is a low intensity positive impact and helps to maintain the habitat. Undergrazing represents a medium intensity negative impact affecting 10% of the site, and this has resulted in tall, rank vegetation in the area affected. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate due to agricultural improvements, fencing, agricultural buildings and stock feeding. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Overall conservation assessment

Two of the parameters were assessed as Unfavourable-Inadequate while one parameter was assessed as Favourable. During the CMP, two of the parameters were assessed as Favourable and one as Unfavourable-Inadequate. The conservation status of **2170 Dunes with creeping willow** was assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

2.2.8 2190 Humid dune slacks

2190 Humid dune slacks are found throughout the main part of the sand dune system at Aghleam, in the Newtown and Aghleam townlands. The vegetation is indicative of damp conditions and a local farmer recalled having seen the slacks flooding in recent years. The presence of **2170 Dunes with creeping willow** indicates that drying out is occurring at the edges of the slacks, and they may have been bigger in the past, but this is a natural process.

Area

There has been a small decrease in the area of **2190 Humid dune slacks** from 24.94 ha recorded during the CMP to 24.85 ha recorded during the SDM. One new dune slack formed in a blow out, but the area of another dune slack had decreased, bringing the total area of dune slack habitat down. There was no sign of direct human induced habitat loss in 2012, although there are scrapes and ponds in the sand dunes which could, in theory, affect the groundwater table. During the CMP, Area was assessed as Favourable. Area was assessed as Favourable (stable) during the SDM.

Structure and Function

One criterion failed in the Structure and Functions assessment. Supplementary feeding rings and artificial ponds were present in several slacks to allow cattle to feed and drink from the groundwater. There were signs of trampling and damage due to disturbance near these features. During the CMP, Structure and Functions were assessed Favourable. Structure and Functions were assessed as Unfavourable-Inadequate (deteriorating) during the SDM.

Future Prospects

Supplementary feeding, artificial ponds and dumping of silage bales had a high-intensity negative effect on the **2190 Humid dune slacks**, while driving in the habitat had a low intensity negative effect. Dumping silage bales may introduce agricultural species into the habitat, and ponds and feeding result in trampling of the habitat. The non-intensive cattle grazing, which was the main management at the site, was a positive impact. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate due to the threat of intensification of grazing and supplementary feeding. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Overall conservation assessment

Area was assessed as Favourable and Future Prospects as Unfavourable-Inadequate during the SDM, and these assessments have not changed since the CMP. Structure and Functions was assessed as Unfavourable-Inadequate during the SDM, which is less positive than the Favourable assessment during the CMP. The conservation status of **2190 Humid dune slacks** was assessed as Unfavourable-Inadequate (deteriorating) during the CMP.

*2.2.9 *21A0 Machairs*

***21A0 Machairs** are found in the north and south of the site. Much of the southern part of the habitat at Termon and Fallmore is managed as unfenced commonage and is in better condition than the northern section which has been fenced and is used more intensively.

Area

There has been a decrease in the area of ***21A0 Machairs** from 152.17 ha during the CMP to 151.98 ha during the SDM despite succession from **2110 Embryonic shifting dunes** in the southern part of the site. Three polygons were excluded from the ***21A0 Machairs** habitat as they have been degraded by quarrying and would require considerable restoration to be returned to Annex I quality. Examination of the aerial photographs indicates that the disturbed area has increased since 1995. The total area of loss is 1.05 ha. No exact figure was given for the area of loss during the CMP, so the loss since the CMP cannot be calculated. Area was assessed as Unfavourable-Inadequate during the CMP. Because the loss is estimated to be less than 1% per year since the CMP, Area was assessed as Unfavourable-Inadequate (stable) during the SDM.

Structure and Function

Two of the criteria failed in the Structure and Functions assessment. Only two positive indicator species were recorded from one monitoring stop and there were no bryophytes present at two stops. All three of the affected stops were located in the northern section of the ***21A0 Machairs**, which were within the fenced system and showed indications of agricultural improvement. *Lolium perenne* was present here, but not dominant. During the CMP, Structure and Functions were assessed as Unfavourable-Inadequate due to agricultural intensification and damage associated with quarrying. Structure and Functions were assessed as Unfavourable-Inadequate (stable) during the SDM.

Future Prospects

Negative impacts associated with agricultural improvement at Aghleam included supplementary feeding, reseeding and application of fertiliser. Dumping and rubbish burning were also noted in the ***21A0 Machairs**. Quarrying had resulted in disturbance of the substrate of the ***21A0 Machairs**. During the CMP, Future Prospects were assessed as Unfavourable-Inadequate because of threats associated with agriculture and quarrying. Future Prospects were assessed as Unfavourable-Inadequate (stable) during the SDM.

Overall conservation assessment

All of the parameters were assessed as Unfavourable-Inadequate during the SDM, and there has been no change in the assessment for any of the parameters since the baseline survey. The conservation status of ***21A0 Machairs** at Aghleam was assessed as Unfavourable-Inadequate (stable) during the SDM.

3 DISCUSSION

3.1 Agriculture

Those parts of the ***21A0 Machairs** that are within the field system show signs of pressures associated with agriculture. The management is variable, and parts of the habitat contain negative indicator species associated with agricultural improvement, such as *Lolium perenne*, or abandonment, such as *Dactylis glomerata*. Parts of the ***2130 Fixed dunes (grey dunes)** show signs of reseeding as *Lolium perenne* cover is relatively high. A monitoring stop could not be placed in the most obviously improved part of the habitat because of the presence of a bull at the time of survey.

Full fertiliser bags were seen in sheds on the site. The ***21A0 Machairs** habitat is species poor and contains very little bryophyte cover in the far north of the site, and this is likely to relate to agricultural practices including fertilisation. Nutrient enrichment due to fertiliser affects the habitats where it is applied and also has a knock on effect on adjacent sand dune habitats. **2190 Humid dune slacks** and **2170 Dunes with creeping willow** are nutrient limited habitats, which is considered to be partly responsible for their high biological diversity (Verhoeven *et al*., 1996). Increasing nutrient status through surface run off and ground water enrichment could alter the plant communities of these habitats, resulting in reduced diversity.

Artificial ponds have been created in several of the areas of **2190 Humid dune slacks** at Aghleam. These were probably made by bringing machines on site to dig scrapes in the substrate which are deep enough to intercept the groundwater table, and water is present in the ponds throughout the year. Digging ponds increases the rate of evaporation, and this may result in lowering the groundwater table. The alteration to the flooding regime makes part of the **2190 Humid dune slacks** habitat unsuitable for typical dune slack species. Cattle congregate at the edges of the ponds causing poaching and their dung increases the nutrient input within the dune slack. Agricultural weeds are often located in slacks with permanent ponds for this reason.

Ring feeders were present in ***21A0 Machairs**, ***2130 Fixed dunes (grey dunes)** and **2190 Humid dune slacks**. These cause cattle to congregate, resulting in disturbance to the vegetation and raised nutrient input through dung. As a result, weedy species become established.

3.2 Quarrying

Quarrying was noted as an ongoing impact for ***21A0 Machairs** at Aghleam during the CMP. It appears from OSI aerial photographs that the extent of the quarries has increased since the baseline survey, but no work was ongoing on the survey day in 2012. The inclusion of this area in Mullet/Blacksod Bay Complex SAC (SAC 000470) was being contested when the CMP survey took place, but the SAC boundary has not been altered to exclude the quarried fields to date. Quarrying is a cause of major disturbance as the entire surface of the quarried area is removed to access the underlying rock.

3.3 Dune stabilisation

According to local sources, overgrazing resulted in considerable damage to the sand dune habitats in the townlands of Newtown and Aghleam during the middle part of the twentieth century. This lead to large areas of bare sand and sand mobility became problematic. After the land was divided in to individual parcels, the management style changed. Farmers benefitted from allowing the vegetation cover to re-

establish. There are no longer excessive amounts of bare ground in the fixed dunes. This has been a broadly positive development in terms of conservation, despite some of the negative effects of agricultural intensification. The local landowners appear to be very conscious of the threat of erosion, and sand trapping was evident in many of the small blow outs. Currently, this is considered to be a positive impact as the blow outs are generally at least partially caused by the effects of cattle on the habitat, so small-scale stabilisation works can be seen as ameliorating anthropogenic damage. The materials used to stabilise the sand are locally sourced and mimic the role of pioneer vegetation. There are a limited number of blow-outs where unsuitable material such as manure has been used to help stabilise the sand, but as these are relatively few in number, the benefits outweighed the harm done. The amount of bare sand in the dunes is adequate to maintain habitat diversity.

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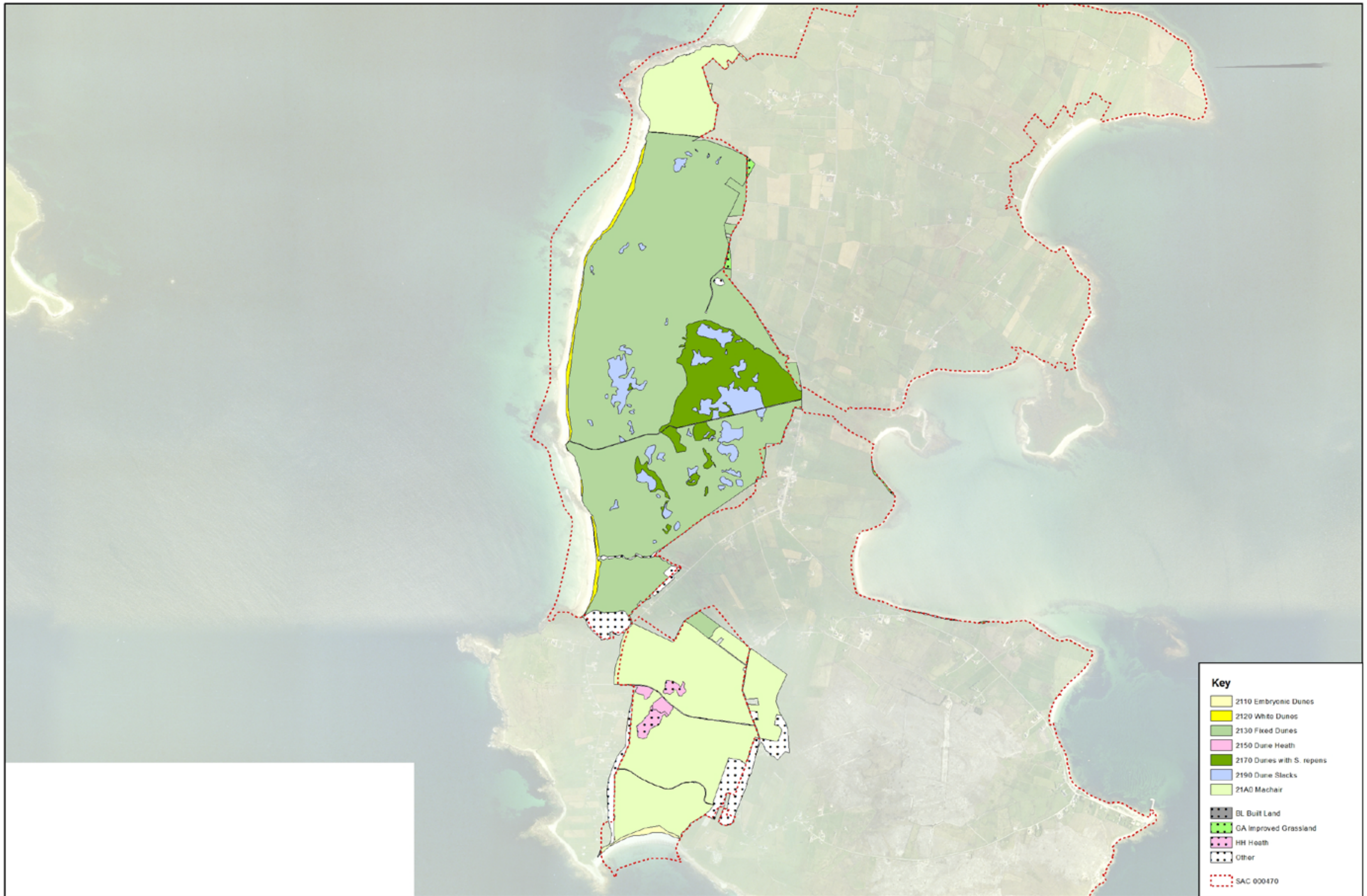


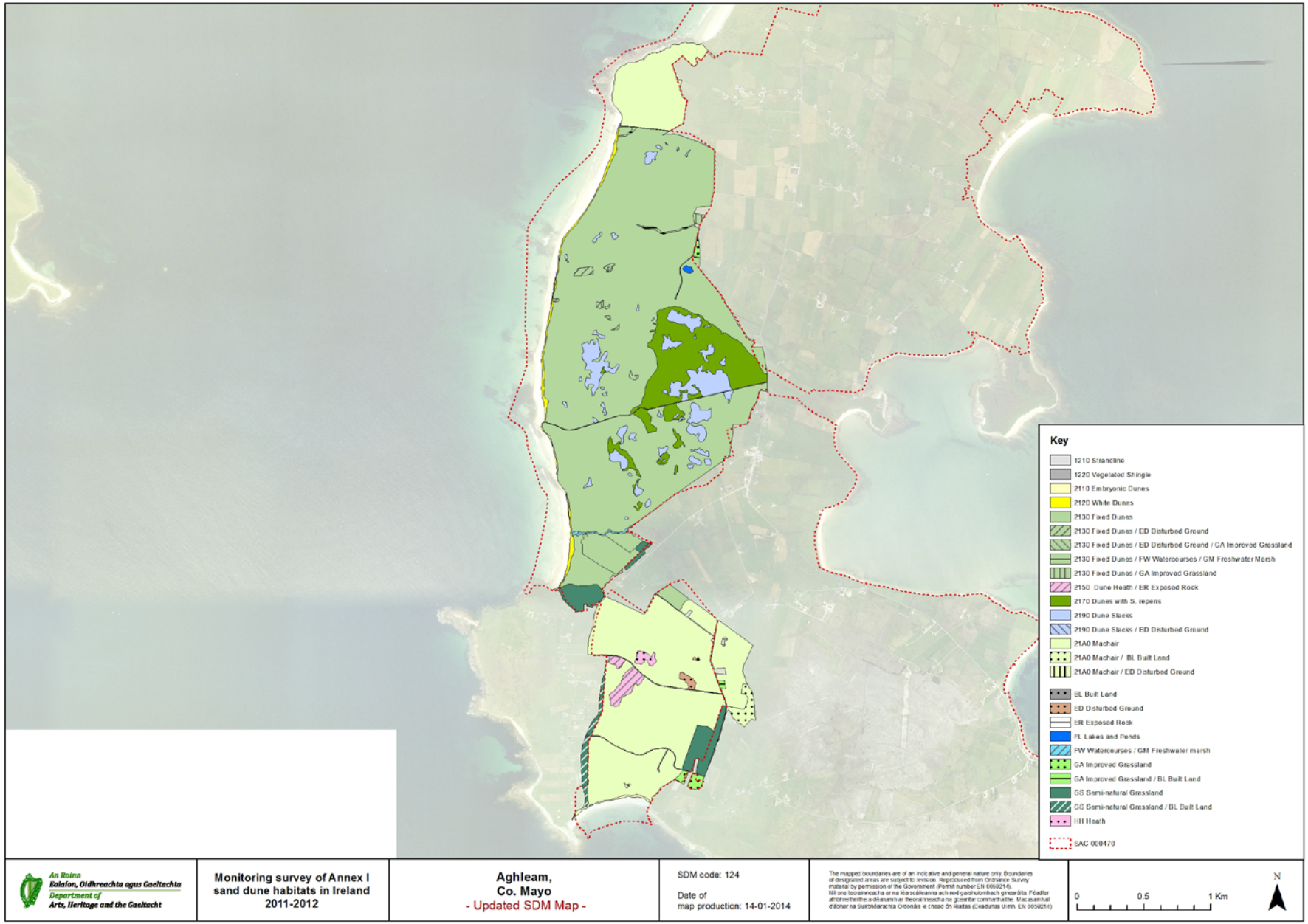
An Roinn
Ealaíon, Oidhreachta agus Gaeltachta
Department of
Arts, Heritage and the Gaeltacht

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

Aghleam,
Co. Mayo
- Revised Baseline Habitat Map -

SDM code: 124

Date of
map production: 14-01-2014


Key
1210 Strandline
1220 Vegetated Shingle
2110 Embryonic Dunes
2120 White Dunes
2130 Fixed Dunes
2130 Fixed Dunes / ED Disturbed Ground
2130 Fixed Dunes / ED Disturbed Ground / GA Improved Grassland
2130 Fixed Dunes / FW Watercourses / GM Freshwater Marsh
2130 Fixed Dunes / GA Improved Grassland
2150 Dune Heath / ER Exposed Rock
2170 Dunes with S. repens
2190 Dune Slacks
2190 Dune Slacks / ED Disturbed Ground
21A0 Machair
21A0 Machair / BL Built Land
21A0 Machair / ED Disturbed Ground
BL Built Land
ED Disturbed Ground
ER Exposed Rock
FL Lakes and Ponds
FW Watercourses / GM Freshwater marsh
GA Improved Grassland
GA Improved Grassland / BL Built Land
GS Semi-natural Grassland
GS Semi-natural Grassland / BL Built Land
HH Heath
SAC 000470
An Roinn Ealaíon, Oidhreachta agus Gaeltachta
Department of Arts, Heritage and the Gaeltacht
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