NPWS

Lackan Saltmarsh and Kilcummin Head SAC (site code: 000516)

Conservation objectives supporting document- Coastal habitats

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Please note that the opinions expressed in the site reports from the Saltmarsh Monitoring Project (SMP) and the Coastal Monitoring Project (CMP) 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 (2016) Conservation Objectives: Lackan Saltmarsh and Kilcummin Head SAC 000516. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.

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 (European Commission, 2013). 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.

Lackan Saltmarsh and Kilcummin Head SAC is a relatively small SAC located in Lackan Bay, 8km north-west of Killala, Co. Mayo. The SAC is of importance for saltmarsh and sand dune habitats. The beach and sand dunes form the seaward part of the site that extends southwards to encompass a large estuary containing intertidal sandflats and extensive saltmarsh. Within this area, there is an excellent diversity of coastal habitats including estuarine sandflats, saltmarsh, shifting dunes, fixed dunes and rocky sea cliffs. A shallow area of open sea and some rocky shore are also included in the SAC. The underlying geology is predominantly carboniferous limestone. The rocky sea cliffs at Kilcummin Head are formed from marine sandstones and carbonate rocks with interesting sedimentary structures and trace fossils (NPWS, 2013).

Within Lackan Bay estuary and along the margins of the Cloonalaghan River, sediments from the river have built up to form an extensive saltmarsh which is representative of both the Atlantic and Mediterranean types of saltmarsh vegetation (NPWS, 2013).

This coastal SAC is of considerable ecological importance for the range, quality and floristic richness of its coastal habitats, in particular the fixed dunes. The rich flora of grassland and dunes supports a great diversity of butterflies and other insects. The butterflies noted here include the six-spotted burnet moth (*Zygaena filipendulae*), cinnabar moth (*Tyria jacobaeae*), meadow brown (*Maniola jurtina*), small heath (*Coenonympha pamphilus*), dark-green fritillary (*Argynnis aglaja*) and common blue (*Polyommatus icarus*) (NPWS, 2013).

This area is important for wintering waders and waterfowl and is used by populations that winter in and around Killala Bay. The SAC overlaps with Killala Bay/Moy Estuary SPA (004036). The SPA is selected for ringed plover (*Charadrius hiaticula*), golden plover (*Pluvialis apricaria*), grey plover (*Pluvialis squatarola*), sanderling (*Calidris alba*), dunlin (*Calidris alpina*), bar-tailed godwit (*Limosa lapponica*), curlew (*Numenius arquata*) and redshank (*Tringa totanus*), as well as for wetlands and waterbirds.

Lackan Saltmarsh and Kilcummin Head SAC (site code: 000516) is selected for the following five coastal habitats which are the Qualifying Interests for the SAC (*denotes a priority habitat):

1310	*Salicornia* and other annuals colonising mud and sand
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)
1410	Mediterranean salt meadows (Juncetaliea maritimi)
2120	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)
2130	Fixed coastal dunes with herbaceous vegetation (grey dunes)*

The first three habitats are associated with saltmarshes and the last two are associated with sand dune systems, although all five habitats are found in close association with each other.

The distribution of the saltmarsh habitats within Lackan Saltmarsh and Kilcummin Head SAC is presented in Appendix I and the distribution of the sand dune habitats is presented in Appendix II. Although *Salicornia* mudflats are not shown on the habitat map, their presence was noted by the SMP, but not at an extent that could be mapped (McCorry, 2007).

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.

This supporting document sets out the conservation objectives for the five coastal habitats listed above in Lackan Saltmarsh and Kilcummin Head SAC, which are 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 **saltmarsh habitats** are based primarily on the results of the Saltmarsh Monitoring Project (SMP) (McCorry, 2007; McCorry and Ryle, 2009) and this document should be read in conjunction with those reports.

The SMP surveyed, mapped and assessed one sub-site associated with Lackan Saltmarsh and Kilcummin Head SAC (McCorry, 2007): Lackan (SMP site ID: SMP0022)

The distribution of saltmarsh habitats within Lackan Saltmarsh and Kilcummin Head SAC is presented in Appendix I. As part of the SMP, a detailed individual report and habitat maps were produced for the Lackan sub-site and these are included in Appendix III in this document. The conservation objectives for the saltmarsh habitats in Lackan Saltmarsh and Kilcummin Head SAC are based primarily on the findings of the SMP at the Lackan sub-site. There may be additional small areas of saltmarsh present within the SAC, however, it is estimated that the Lackan sub-site as surveyed by the SMP represents approximately 99% of the total area of saltmarsh in the SAC.

The targets set for the **sand dune habitats** are based primarily on the results of the Coastal Monitoring Project (Ryle *et al*., 2009) and this document should be read in conjunction with that report.

The CMP surveyed, mapped and assessed a single sub-site associated with Lackan Saltmarsh and Kilcummin Head SAC (Ryle *et al*., 2009):

Lackan (CMP site ID: 129)

As part of the Coastal Monitoring Project (CMP), a detailed individual report and habitat map were produced for the Lackan sub-site, which includes Rathlackan, and these are included in Appendix IV in this document.

The Lackan (Carrowsteelagh) sand dune system is extensive in area, largely intact and supports species-rich vegetation that reflects the calcareous nature of the site. Rathlackan is a separate area

to the west of the bay that supports embryonic dunes, shifting dunes and a small area of fixed dunes. However, this area is severely eroded due to intensive cattle grazing (Ryle *et al*., 2009).

The conservation objectives for the sand dune habitats in Lackan Saltmarsh and Kilcummin Head SAC are based on the findings of the CMP, combined with the results of Gaynor (2008). It is thought that the sub-site as surveyed by the CMP represents the entire area of sand dunes within Lackan Saltmarsh and Kilcummin Head SAC.

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) (1330)**
- **Mediterranean salt meadows (Juncetalia maritimi) (1410)**
- Mediterranean and thermo-Atlantic Halophilous scrubs (Sarcocornetea fruticosi) (1420)

The three habitats, indicated in bold, are listed as Qualifying Interests for Lackan Saltmarsh and Kilcummin Head SAC. The last habitat is restricted in its distribution to sites in the south-east of the country.

The SMP surveyed, mapped and assessed the following saltmarsh sub-site associated with Lackan Saltmarsh and Kilcummin Head SAC (McCorry, 2007):

Lackan (SMP site ID: SMP0022; see Appendix III)

The known distribution of saltmarsh habitats within Lackan Saltmarsh and Kilcummin Head SAC is presented in Appendix I.

3.1 Overall Objectives

The overall objective for '*Salicornia* and other annuals colonising mud and sand' in Lackan Saltmarsh and Kilcummin Head SAC is to '*restore the favourable conservation condition*'.

The overall objective for 'Atlantic salt meadows (Glauco-Puccinellietalia maritimae)' in Lackan Saltmarsh and Kilcummin Head SAC is to '*maintain the favourable conservation condition*'.

The overall objective for 'Mediterranean salt meadows (Juncetalia maritimi)' in Lackan Saltmarsh and Kilcummin Head 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.

3.2 Area

3.2.1 Habitat area

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target is that there is no decrease from the baseline which was established by McCorry (2007). 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.

A baseline habitat map of all known saltmarsh in Lackan Saltmarsh and Kilcummin Head SAC was produced based on the findings of the SMP (McCorry, 2007) and is presented in Appendix I. A total of 97.46ha of saltmarsh habitat was mapped by the SMP within the SAC at Lackan and an additional 0.27ha of potential saltmarsh habitat was identified using aerial photographs, to give a total estimated area of 97.73ha within Lackan Saltmarsh and Kilcummin Head SAC (see Appendix I).

The total areas of each saltmarsh habitat, i.e. *Salicornia* mudflats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM), within the sub-site as mapped by the SMP and the total areas of each saltmarsh habitat within the boundary of the SAC and are presented in the following tables.

There are a number of differences in the figures below. Most of the differences can be explained by the fact that the SMP mapped the total saltmarsh resource and not all of the saltmarsh mapped is contained within the SAC boundary. In addition, the total area within the SAC can be greater than given in the SMP as the SMP did not include any mosaics when calculating their total areas. The following rules were applied when calculating the areas for the SAC'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)**
Lackan	0.001	0.001 (not mapped)

Very little of the Annex I habitat, *Salicornia* and other annuals colonising mud and sand (1310) was recorded at the site by the SMP and the area (0.001ha) was too small to map. The pioneer saltmarsh community dominated by common saltmarsh-grass (*Puccinellia maritima*) and containing frequent glasswort (*Salicornia* spp.) was classified as ASM during the SMP survey (McCorry, 2007).

Source	**Total area (ha) of ASM (excluding mosaics) from SMP**	**Total area (ha) of ASM within SAC boundary (including mosaics)**
Sub-site: Lackan	28.27	32.43
Potential ASM		0.27
Total	**28.27**	**32.7**

Sub-site	Total area (ha) of MSM (excluding mosaics) from SMP	Total area (ha) of MSM within SAC boundary (including mosaics)
Lackan	66.00	65.03

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

3.3 Range

3.3.1 Habitat distribution

The saltmarsh is located in a sheltered valley, filling the valley plain. The Cloonalaghan River flows through the saltmarsh and into Lackan Bay. The saltmarsh is fairly extensive at 0.7km wide and 1.6km long. Lackan Bay contains extensive sandflats and is enclosed by a spit with a sand dune system at the seaward end (McCorry, 2007).

The saltmarsh is mostly contained in one large main unit. A band of saltmarsh extends along the north-western and north-eastern shorelines of Lackan Bay, which eventually narrows out and transitions to sand dune and sandy beach habitats (McCorry, 2007).

There is a typical distribution of Atlantic salt meadows and Mediterranean salt meadows, with ASM occurring at the seaward side of the saltmarsh and MSM occurring at the landward side. ASM is also frequent along the edges of the larger creeks and the main river channel. ASM also occurs along the western side of Lackan Bay (McCorry, 2007).

Overall, the site is dominated by Mediterranean salt meadows. This habitat dominates the western side of Cloonalaghan River and the southern part of the saltmarsh. Atlantic salt meadows occur in the north-eastern section of the saltmarsh and along a narrow band in the north-west area. At the front of the marsh, there are several well-defined clumps of dense sea rush (*Juncus maritimus*) present amongst the ASM, which have developed on slightly raised ground. There are also several significant areas of ASM/MSM mosaic with low ASM sward occurring between the large clumps of sea rush (*Juncus maritimus*) (McCorry, 2007).

Very little of the Annex I habitat *Salicornia* and other annuals colonising mud and sand (1310) was recorded at the site by the SMP. No glasswort (*Salicornia* spp.) was recorded on the intertidal sandflats. Only small patches (1-3m in diameter) containing glasswort (*Salicornia* spp.) were present on sand and mud banks located in some of the large creeks and a small area 1-2m long was recorded in the Cloonalaghan River channel. The SMP suggests that there is no information to indicate that the area of *Salicornia* flats was more significant in the past (McCorry, 2007).

The absence of the *Salicornia* mudflats at the time of the SMP survey may be due to the natural processes at the site. *Salicornia* mudflats are a pioneer community and the constant shifting of the Cloonalaghan River channel may have limited the opportunity for any pioneer plant communities to form. Small patches are likely to develop along the Cloonalaghan River channel within the saltmarsh area (McCorry, 2007).

The distribution of each saltmarsh habitat at Lackan Saltmarsh and Kilcummin Head SAC can be found in Appendix I.

The target is that there should be no decline or change in the distribution of the 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 Lackan Saltmarsh and Kilcummin Head SAC 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.

Within the estuary and along the margins of the Cloonalaghan River, sediments originating from the river have built up to form an extensive saltmarsh. Some accretion is currently occurring on the northern side of the river channel. New saltmarsh has developed along the western side of Lackan Bay extending along the shoreline from the main area of saltmarsh and in the north-eastern corner of the saltmarsh (2.9ha). These erosion/accretion cycles are natural responses to geomorphological changes within Lackan Bay (McCorry, 2007).

Natural erosion is occurring along the northern saltmarsh boundary, as the Cloonalaghan River channel is situated along the edge of the saltmarsh. The river has caused significant erosion of the saltmarsh, with a high saltmarsh cliff present. It is estimated that between 20-40m (2.8ha) of saltmarsh has been eroded away on both sides of the saltmarsh (but mainly on the eastern side) in the past 70 years and that 2-3m (0.1ha) has been eroded in the past 15 years. The erosion is being caused by shifts in the Cloonalaghan River channel, which previously flowed through the central part of Lackan Bay, but now flows along the eastern side of the bay (McCorry, 2007).

The target is to maintain, or where necessary restore, 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.

At Lackan Saltmarsh and Kilcummin Head SAC, the topography of the saltmarsh is well-developed with salt pans of all sizes occurring throughout the habitat. The creek network is also well-developed and many of the creeks contain very soft mud and are unusually deep. The original creek network has been affected by drainage with some of the channels in the mid-eastern part of the saltmarsh having been artificially deepened and straightened in the past. The creek and pan topography in the MSM is very well-developed with frequent pans and a dense network of creeks (McCorry, 2007).

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 Cloonalaghan River flows through Lackan Saltmarsh and Kilcummin Head SAC to the sea. West of the Cloonalaghan River, freshwater streams flow down from the hillside, filling the ditches amid the grassland (McCorry, 2007).

There have been drainage and land reclamation works in the past with regularly-spaced drains across the north-western section of the saltmarsh linking with drains from adjacent wet grassland on slopes to the Cloonalaghan River. The western boundary has a significant freshwater/brackish influence along the edge of the saltmarsh that probably has been influenced by the old drainage works. Spoil from drains across the saltmarsh has been deposited on the saltmarsh and forms low ridges. These drains are also likely to have been deepened/cleaned in the past. These drainage works had significant impacts in the past and are probably still having some residual impacts (McCorry, 2007).

According to McCorry (2007), the saltmarsh is probably affected by agricultural run-off from the adjacent farmland, as the saltmarsh occurs in a basin. This causes nutrient enrichment of the marsh, which may lead to the spread of common reed (*Phragmites australis*), but the saltwater influence of the tide will act to restrict its spread.

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. In order to ensure the ecological functioning of all of the saltmarsh habitats, it is vital to maintain the zonations and transitions to other habitats, including intertidal, shingle and sand dune habitats.

There are significant natural transitional habitats such as reedbeds, brackish areas, wet and dry grassland, and fixed dune grassland bordering about 70% of the landward saltmarsh boundaries on relatively low slopes. The boundary along the eastern side is fairly distinct with a sharp transition between the saltmarsh habitats and adjacent improved agricultural grassland, which develops on moderately sloping land that extends from the edge of the saltmarsh plain up the slopes of the valley (McCorry, 2007).

There are significant bands of wet grassland dominated by yellow flag (*Iris pseudacorus*) creating a diverse transitional habitat. Along other parts of the boundary there is a transition between sea rush (*Juncus maritimus*) and soft rush (*Juncus effusus*) (wet grassland) where a low slope develops, indicating the saltmarsh boundary. There are usually fences or overgrown hedgerows along the saltmarsh boundary (McCorry, 2007).

Occasional clumps of grey club-rush (*Schoenoplectus tabernaemontani*) also occur in this transitional area. Some of the boundary along the western side is distinct with a sharp transition between reedbeds and the sea rush (*Juncus maritimus*) stands (McCorry, 2007).

The saltmarsh boundary is less distinct along the southern boundary as there is a transitional area with frequent common reed (*Phragmites australis*) and sea club-rush (*Bolboschoenus maritimus*) stands amongst patches of sea rush (*Juncus maritimus*) (MSM) and disturbed areas of ASM, possibly recovering from recent land reclamation (McCorry, 2007).

ASM occurs in mosaic with some fixed dune grassland on some of the higher mounds and there are patches of embryonic dune developing as well. Species such as sand sedge (*Carex arenaria*) also occur on the marsh here (McCorry, 2007).

Several typical low/mid and upper ASM plant communities are present, reflecting zonation. There is additional internal zonation of vegetation along the creeks with narrow bands of common saltmarsh-grass (*Puccinellia maritima*) dominated vegetation developing. These bands occasionally develop on ‘steps’ or lower ground at the edge of the creek. There are patches of ASM in a mosaic area dominated by sea rush (*Juncus maritimus*) in the south-east section. These mosaics of ASM/MSM could be considered transition areas between the two habitats (McCorry, 2007).

Some MSM mounds along the western side contain species such as white clover (*Trifolium repens*), common bird’s-foot-trefoil (*Lotus corniculatus*) and silverweed (*Potentilla anserina*) indicating the ground level is close to the terrestrial transition zone. A low ridge containing dry grassland extends from the mid-eastern boundary. Most of the transitional saltmarsh habitat occurs alongside MSM (McCorry, 2007).

Towards the south-east corner there is a mound containing dry grassland, dry heath and some gorse (*Ulex europaeus*) scrub. Gorse dominated scrub extends into the saltmarsh along enclosure edge/drains on low ridges/ditches in the north-west section (McCorry, 2007).

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 saltmarsh vegetation of Lackan Saltmarsh and Kilcummin Head SAC is composed of a closely-cropped turf as sheep graze the eastern side of the saltmarsh. According to McCorry (2007), the sheep grazing level on the ASM is moderate overall, and has created a typical low sward (1-2cm high). Species diversity has not been affected and is typical of this habitat. Further back in the saltmarsh, grazing is not as significant and there are patches of taller ASM (0.4m high). The grazing level is low in the MSM as the dense patches of sea rush (*Juncus maritimus*) protect the other vegetation. The level of grazing decreases towards the southern end of the marsh (McCorry, 2007).

Parts of the western side of the marsh are grazed by cattle but overall the grazing level is low. West of the Cloonalaghan River, the vegetation is taller and more luxuriant. Significant cattle grazing and poaching was evident in a small area (enclosure) in the north-eastern corner according to McCorry (2007). However, this was not affecting the saltmarsh significantly overall (McCorry, 2007).

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.

At Lackan Saltmarsh and Kilcummin Head SAC, there are vehicle tracks and wheel ruts on the ASM at the north-western and north-eastern corners of the saltmarsh where minor roads allow access to the sandflats and Lackan Bay (McCorry, 2007).

Grazing is not significantly affecting the MSM, as the dense sea rush (*Juncus maritimus*) sward protects the other species to some extent. However, the MSM habitat was damaged in one area due to heavy cattle poaching. The areas affected were localised and accounted for about 10% of the total area of MSM (McCorry, 2007).

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

3.4.7 Vegetation composition: typical species and 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*).

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 Lackan Saltmarsh and Kilcummin Head SAC 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 spp.	*Glaux maritima*
	Suaeda maritima	*Seriphidium maritimum*
	Salicornia spp.	*Juncus maritimus*
	Glaux maritima	*Triglochin maritima*
	Turf fucoids	*Blysmus rufus*
		Eleocharis uniglumis
		Leontodon autumnalis
		Carex flacca
		Carex extensa
		Turf fucoids

At Lackan Saltmarsh and Kilcummin Head SAC, the front of the ASM vegetation is dominated by a thrift (*Armeria maritima*) and sea plantain (*Plantago maritima*) sward. Other species in this turf include sea milkwort (*Glaux maritima*), common saltmarsh-grass (*Puccinellia maritima*), red fescue (*Festuca rubra*) and saltmarsh rush (*Juncus gerardii*). Occasional species include prostrate forms of glasswort (*Salicornia* spp.), annual sea-blite (*Suaeda maritima*), common scurvygrass (*Cochlearia officinalis*) and sea arrowgrass (*Triglochin maritimum*) (McCorry, 2007).

Sea rush (*Juncus maritimus*) occurs on slightly elevated sites and its sharp stems protect succulent plants such as common scurvygrass (*Cochlearia officinalis*) and sea aster (*Aster tripolium*). Sea club-rush (*Bolboschoenus maritimus*) and common reed (*Phragmites australis*) are present in the ditches. This limited species diversity is typical of MSM habitat. There is a good selection of other plants scattered through this stand, reflecting both the freshwater and saltwater influences. These include spurrey (*Spergularia* spp.), parsley water-dropwort (*Oenanthe lachenalii*) and sea arrowgrass (*Triglochin maritima*) (McCorry, 2007).

At the front of the ASM in Lackan Saltmarsh and Kilcummin Head SAC, there are several well-defined clumps of dense sea rush (*Juncus maritimus*) present amongst the ASM, developed on slightly raised mounds. The MSM becomes more frequent further back in the marsh and develops along the landward boundaries. Sea rush is dominant in the sward, along with the grasses red fescue (*Festuca rubra*) and creeping bent (*Agrostis stolonifera*) and saltmarsh rush (*Juncus gerardii*) (McCorry, 2007).

There is glasswort (*Salicornia* spp.), and occasional annual sea-blite (*Suaeda maritima*), associated with these areas. This vegetation type also occurs at the seaward boundary along the north-east corner of the site (McCorry, 2007).

Other occasional species include autumn hawkbit (*Leontodon autumnalis*), sea milkwort (*Glaux maritima*), sea aster (*Aster tripolium*), sea arrowgrass (*Triglochin maritimum*), common scurvygrass (*Cochlearia officinalis*) and sea plantain (*Plantago maritima*). Other species recorded include long-bracted sedge (*Carex extensa*), lax-flowered sea lavender (*Limonium humile*), spear-leaved orache (*Atriplex prostrata*), greater sea-spurrey (*Spergularia media*), buck's-horn plantain (*Plantago coronopus*) and parsley water-dropwort (*Oenanthe lachenalii*). The occurrence of lax-flowered sea lavender (*Limonium humile*) in this habitat is notable as it was not recorded here before. A spike-rush species (*Eleocharis* sp.) was also recorded in an area with some freshwater influence (McCorry, 2007).

Dense stands of sea rush (*Juncus maritimus*) occur to the west of Cloonalaghan River. There are patches of almost 100% monocultures of this species. There are significant patches with common reed (*Phragmites australis*) spreading into the MSM in the south-west section and along the western side. Where it is frequent, it is classed as brackish habitat (McCorry, 2007).

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.

3.4.8 Vegetation composition: negative indicator species

The only invasive and non-native species recorded on saltmarshes during the SMP was common cordgrass (*Spartina anglica*) (McCorry, 2007; McCorry and Ryle, 2009).

Common cordgrass (*Spartina anglica*) was not recorded at this site during the SMP (McCorry, 2007).

The aim is that negative indicators such as common cordgrass (*Spartina anglica*) should be absent or under control. The current target for this particular site is that common cordgrass should not be allowed to establish.

4 Sand dune habitats

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

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

- Annual vegetation of drift lines (1210)
- Embryonic shifting dunes (2110)
- **Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2120)**
- **Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130) ***
- Decalcified dunes with *Empetrum nigrum* (2140) *
- Atlantic decalcified fixed dune (Calluno-Ulicetea) (2150) *
- Dunes with *Salix repens* subsp. *argentea* (Salicion arenariae) (2170)
- Humid dune slacks (2190)
- Machairs (21A0) *

Four dune habitats were recorded by Ryle *et al*. (2009) from Lackan Saltmarsh and Kilcummin Head SAC, two of which, indicated in bold above, are listed as Qualifying Interests for the SAC. These habitats include mobile areas at the front as well as more stabilised parts of dune systems. Small areas of annual vegetation of drift lines and embryonic dunes were also recorded, but these habitats are not listed as Qualifying Interests for the SAC.

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 strands 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 than in the embryonic dunes, 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 refer 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).

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.

Detailed descriptions from the Coastal Monitoring Project (Ryle *et al*., 2009) of each sand dune habitat found at Lackan (CMP site ID: 129) are presented in Appendix IV. A total of 98.07ha of sand dune habitats was mapped within Lackan Saltmarsh and Kilcummin Head SAC, 98ha (99.9%) of which represents habitats that are listed as Qualifying Interests for this particular SAC.

4.1 Overall objectives

The overall objective for 'Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes)' in Lackan Saltmarsh and Kilcummin Head SAC is to '*restore the favourable conservation condition*'.

The overall objective for 'Fixed coastal dunes with herbaceous vegetation (grey dunes)' in Lackan Saltmarsh and Kilcummin Head 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 area

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 in the Lackan sub-site during the Coastal Monitoring Project (CMP) (Ryle *et al*., 2009). This map is included with the individual site report in Appendix IV at the end of this document.

The total areas of each Qualifying Interest (QI) sand dune habitat as estimated by Ryle *et al*. (2009) within the Lackan sub-site (including Rathlackan) are presented in the second column in the table

below. The figures for the total area of each QI habitat within the boundary of Lackan Saltmarsh and Kilcummin Head SAC are presented in the third column of the following table.

Habitat	Total area (ha) of habitat from CMP: Lackan	Total area (ha) of habitat within SAC boundary
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2120)	2.83	2.82
Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)*	103.37	95.18
Total	**106.2**	**98.0**

The target for this attribute in the case of both habitats 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 within Lackan Saltmarsh and Kilcummin Head SAC, as mapped by Ryle *et al*. (2009), is presented in Appendix II.

The sand dunes at Lackan Saltmarsh and Kilcummin Head SAC are dominated by fixed dunes. Small areas of shifting marram (*Ammophila arenaria*) dunes also occur. The north-facing sand dune boundary extends over approximately 2km. The western side of the sand dunes is a spit that lies to the landward side of Lackan Strand, while the eastern side of the dunes extends into higher ground to the south of Kilcummin Head. The west-facing sand dune boundary extends over approximately 1.2km of shoreline, on the north-east boundary of the large estuary. The Cloonalaghan River enters the sea on the western side of the dunes. The course of the river channel may change over time and can clearly be a factor in shaping the sand dunes (Ryle *et al*., 2009).

The eastern end of the dune grassland and some particularly high rocky ground in the south of the site were mapped by the CMP as fixed dunes, although the elevated ground and distance from the main sediment source at the eastern extreme suggest that sand cover may not be significant at this point (Ryle *et al*., 2009).

There is a small area sand dunes on the north-west side of Lackan Bay which, due to its isolation from the main sand dune area, is treated by the CMP as a sub-site identified as 'Rathlackan'. This small sand spit consists mostly of fixed dune grassland and some small areas of both embryonic dunes and mobile dunes (Ryle *et al*., 2009). Mobile dunes are absent from all but the more westerly reaches of the spit.

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

4.4 Structure and Functions

The location, character and dynamic behaviour of sand dunes are governed by a combination of geographic, climatic, edaphic and anthropogenic factors. Sand dunes are highly complex, dynamic systems, where the habitats occur in a complex and constantly evolving and changing mosaic. They function as systems in terms of geomorphology and hydrology and maintaining the favourable conservation condition of the habitats present depends on allowing these processes to continue unhindered. Maintaining the favourable conservation condition of the sand dune habitats in Lackan Saltmarsh and Kilcummin Head 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, thus increasing biodiversity. The construction of physical barriers can interfere with the sediment circulation by cutting the dunes off from the beach resulting in fossilisation or over-stabilisation of dunes.

The north-facing (seaward) side of the Lackan fixed dunes has a highly eroded dune face which, coupled with the lack of any substantially accreting habitat and no significant foredune development, suggests the system is being depleted of sediment. However, a wider band of healthy marram at the west tip of the spit reflects the movement of locally re-worked sediment in this direction (Ryle *et al*., 2009).

The sandhills at the Rathlackan sub-site are eroded, which may facilitate the release of sediment for local re-working. There appears to have been some attempts at dune protection through the planting of marram (*Ammophila arenaria*) and lyme-grass (*Leymus arenarius*) on heaped banks of sand and cobbles (Ryle *et al*., 2009).

It is not clear to what degree human activities may have contributed to erosion in recent times, but the scale of events suggests that natural causes, such as wind and wave action, are mostly responsible (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 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 outer zone of the Lackan Saltmarsh and Kilcummin Head SAC is dominated by a sand dune system and a sandy beach. The sand dunes are dominated by fixed dunes with small areas of shifting marram (*Ammophila arenaria*) dunes also present. The mobile dunes at Rathlackan extend around the seaward edge of the spit. Behind the dunes, there are sheltered intertidal sandflats which in turn are backed by extensive saltmarsh (Ryle *et al*., 2009).

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

4.4.3 Vegetation structure: bare ground

This target applies to the fixed dunes. It does not apply to other Annex I dune habitats present in the SAC where high levels of bare sand are a natural component of the habitat. In the fixed 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.

At Lackan Saltmarsh and Kilcummin Head SAC, grazing is the main landuse and the sand dunes and beach areas are popular for recreational activities. During the CMP, a cattle herd was recorded as occupying the eastern side of the fixed dunes. The inner part of the dunes is unfenced and the livestock have free movement throughout the fixed dune area. Livestock grazing was lower than previous years, according to information received from the herd owner during the CMP (Ryle *et al*., 2009).

Along the western boundary of the site that faces into the estuary, the dunes rise more gently from the beach level, although there is also some slumping of fixed dune vegetation here also, probably at least partly due to the erosive action of the Cloonalaghan River that flows in a wide channel along the western side of the dunes, before entering the sea at Lackan strand (Ryle *et al*., 2009).

At Lackan Saltmarsh and Kilcummin Head SAC, recreational pressures have increased in recent times. However, the dunes seem to escape most of the pressures of amenity use, as walking and other associated activities are mostly concentrated on the beach areas. This is certainly at least in part due to the fencing around the dune edge and the presence of grazing stock in the dune grassland. At Rathlackan, the more severely eroded condition of the northern part of the spit due to cattle grazing is clearly evident (Ryle *et al*., 2009).

The target is not to exceed 10% bare sand. This target is assessed subject to natural processes.

4.4.4 Vegetation structure: sward height

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

The dunes at Lackan Saltmarsh and Kilcummin Head SAC have been grazed by cattle in recent years. Ryle *et al*. (2009) noted the presence of significant populations of species such as creeping thistle (*Cirsium arvense*) and common ragwort (*Senecio jacobaea*) as indicative of previous overgrazing. However, they also noted that, at the time of CMP, lower stocking densities and the presence of significant areas characterised by a long sward suggested that there was a recent trend towards undergrazing (Ryle *et al*., 2009).

At the Rathlackan sub-site, a fence running across the width of the spit forms a boundary between the grazed and ungrazed parts of the grassland. North of the fence is grazed and is characterised by a short sward, while the ungrazed southern tip of the spit contains abundant marram (*Ammophila arenaria*) (Ryle *et al*., 2009).

Rabbits were present at the site, although the population, estimated by the number of burrows seen, did not appear to be excessive (Ryle *et al*., 2009).

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

4.4.5 Vegetation composition: plant health of dune grasses

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

Although mobile dunes occur along the full northern edge of the spit at Lackan Saltmarsh and Kilcummin Head SAC, the characteristic vegetation of marram (*Ammophila arenaria*) is frequently quite sparse and/or has an unhealthy appearance, reflecting the general lack of sediment mobility along the seaward edge of the dunes. There are substantial areas in which much of the characteristic vegetation was unhealthy. Only at the western tip of the spit, where accreting or locally recycled

sediment accumulates, is there a substantial band of healthy marram (*Ammophila arenaria*) (Ryle *et al*., 2009).

At Rathlackan, most of the marram (*Ammophila arenaria*) in the habitat was healthy. The redistribution of sediment from Lackan dunes on the other side of the estuary may provide a sufficient input of sand to support healthy growth of the habitats typical species (Ryle *et al*., 2009).

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

4.4.6 Vegetation composition: typical species and 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 bird's-foot trefoil (*Lotus corniculatus*), wild thyme (*Thymus polytrichus*), kidney vetch (*Anthyllis vulneraria*), wild pansy (*Viola tricolor*) and biting stonecrop (*Sedum acre*).

The mobile dune habitat at Rathlackan was characterised by the presence of marram (*Ammophila arenaria*). Also present in places was lyme-grass (*Leymus arenarius*), although this, like some of the marram present, appeared to owe its existence there to dune protection works that involved planting the pioneer grasses into heaped and stabilised sand and cobble banks (Ryle *et al*., 2009).

The more commonly noted species in the fixed dunes included pyramidal orchid (*Anacamptis pyramidalis*), sand sedge (*Carex arenaria*), glaucous sedge (*C. flacca*), red fescue (*Festuca rubra*), lady's bedstraw (*Galium verum*), cat's ear (*Hypochaeris radicata*), common bird's-foot-trefoil (*Lotus corniculatus*), field wood-rush (*Luzula campestris*), mouse-ear-hawkweed (*Pilosella officinarum*), ribwort plantain (*Plantago lanceolata*), yellow-rattle (*Rhinanthus minor*), wild thyme (*Thymus polytrichus*) and Germander speedwell (*Veronica chamaedrys*). Other species noted included smooth hawk's-beard (*Crepis capillaris*), orchids (*Dactylorhiza* spp.), crested hair-grass (*Koeleria macrantha*) and wild pansy (*Viola tricolor* subsp. *curtisii*) (Ryle *et al*., 2009).

Two interesting species were noted within the site, twayblade (*Listera ovata*) and the parasitic dodder (*Cuscuta epithymum*). The presence of dodder and species such as pyramidal orchid reflects the calcareous nature of the site (Ryle *et al*., 2009).

Bryophyte and lichen communities are well-represented and bryophyte cover was notably high through much of the dune grassland. The more common species noted included *Climacium dendroides*, *Homalothecium lutescens*, *Hypnum cupressiforme*, *Rhytidiadelphus squarrosus*, *R. triquetrus* and *Syntrichia ruralis* subsp. *ruraliformis* (Ryle *et al*., 2009).

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

4.4.7 Vegetation composition: negative indicator species

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

The main invasive species identified in Gaynor (2008) were bracken (*Pteridium aquilinum*) and sea buckthorn (*Hippophae rhamnoides*). The invasion of non-native species compromises the typical plant community structure. Bracken 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 sea buckthorn, which can form dense impenetrable thickets.

At Lackan Saltmarsh and Kilcummin Head SAC, the localised proliferation of species such as creeping thistle (*Cirsium arvense*), spear thistle (*C. vulgare*) and common ragwort (*Senecio jacobaea*) in the fixed dunes was noted. The more intensively managed areas of Rathlackan also contain a high cover of weed species, particularly common ragwort (*Senecio jacobaea*), with coarse grasses such as cock's-foot (*Dactylis glomerata*) and rough meadow-grass (*Poa trivialis*) dominating much of the area (Ryle *et al*., 2009).

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

4.4.8 Vegetation composition: scrub/trees

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

At Lackan Saltmarsh and Kilcummin Head SAC, there were occasional stunted hawthorn (*Crataegus monogyna*) shrubs in the fixed dune grassland, although the total shrub and tree cover was not considered significant by Ryle *et al*. (2009).

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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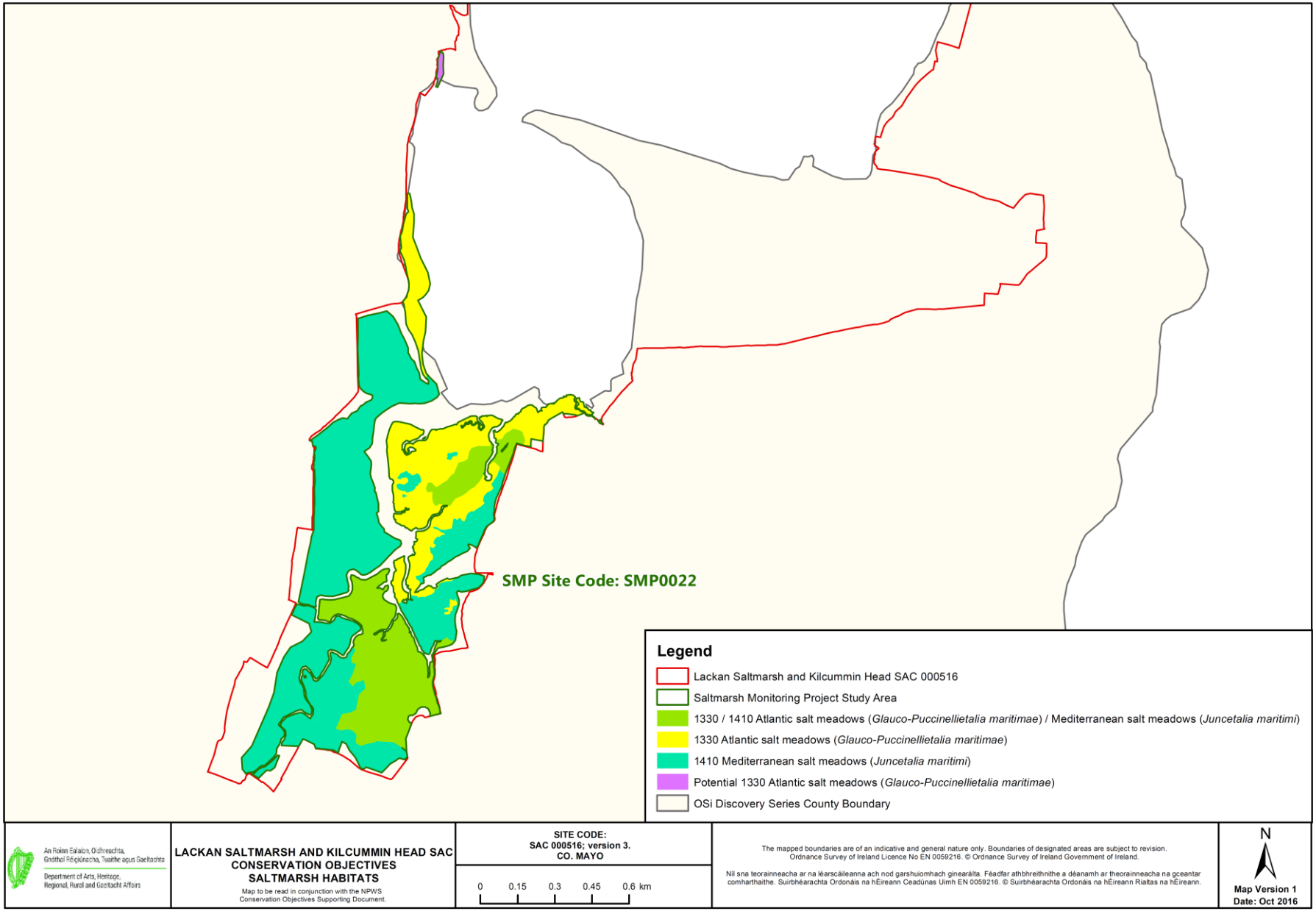
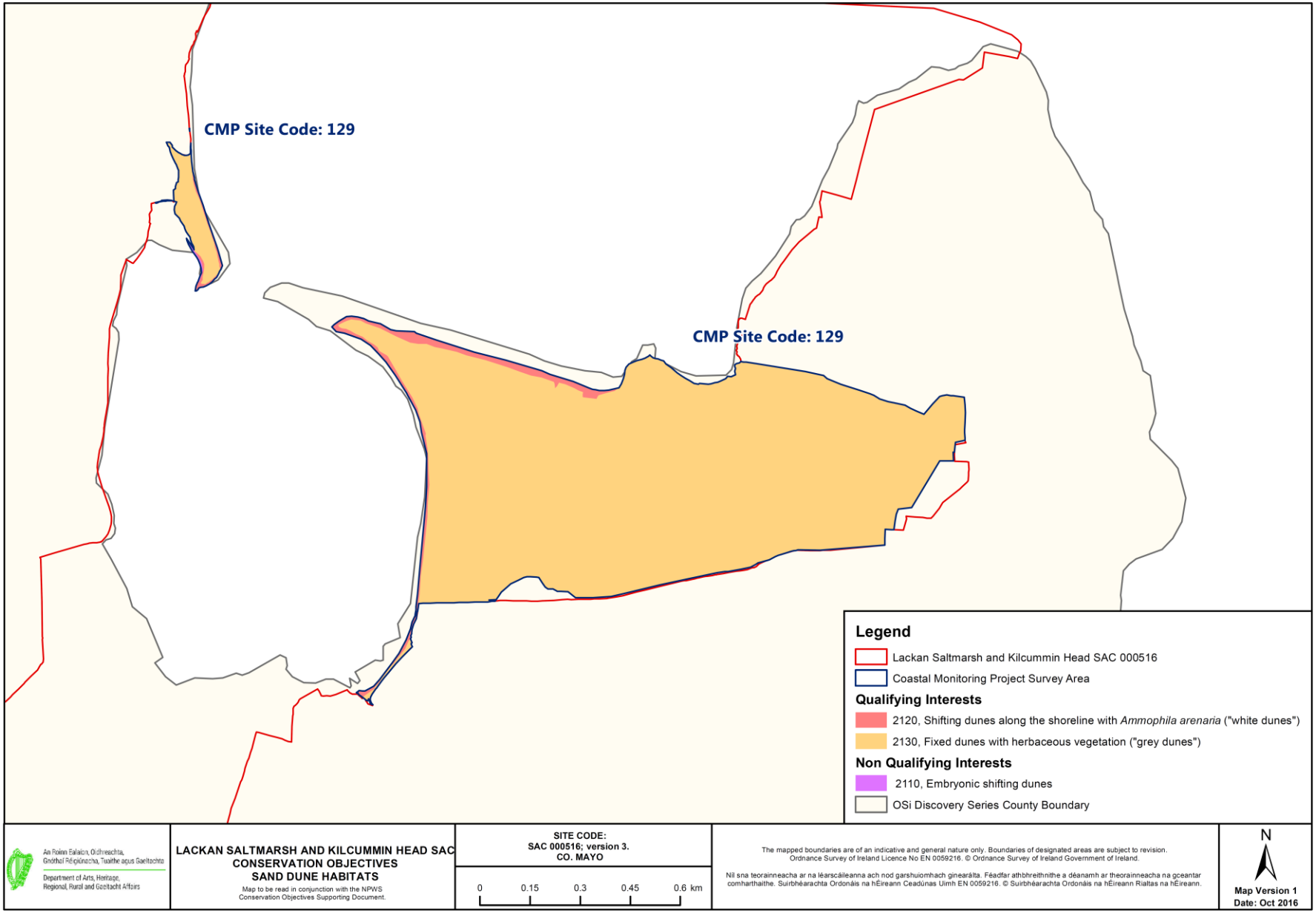
Appendix I – Distribution map of Saltmarsh habitats within Lackan Saltmarsh and Kilcummin Head SAC



Appendix II – Distribution map of Sand dune habitats within Lackan Saltmarsh and Kilcummin Head SAC



Appendix III – Lackan site report and habitat map from the Saltmarsh Monitoring Project (McCorry, 2007)

1 SITE DETAILS

SMP site name: Lackan	**SMP site code:** SMP0022
Site name (Curtis list): Lackan	**CMP site code:** 129
	Site No: (Curtis list): 44
NPWS Site Name: Lackan Saltmarsh and Kilcummin Head	**Dates of site visit:** 11/09/2006
NPWS designation: cSAC: 000516 pNHA: 000516	**MPSU Plan:**
County: Mayo	**Discovery Map:** 24 **Grid Ref:** 118170, 335750
6 inch Map No: Ma008, Ma014, Ma015,	**Aerial photos (2000 series):** 01000-a, 01000-b, 01000-c, 01000-d, 00944-d

Annex I habitats currently designated for Lackan saltmarsh and Kilcummin Head cSAC:

Salicornia and other annuals colonizing mud and sand (1310)
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (1330)
Mediterranean salt meadows (Juncetalia maritimi) (1410)

Saltmarsh type: Sandflats	**Substrate type:** Sand/Mud

2 SITE DESCRIPTION

Lackan saltmarsh is located 8 km north-west of Killala Town in north Mayo. The saltmarsh is located in a sheltered valley, filling the valley plain. The Cloonalaghan River flows through the saltmarsh and into Lackan Bay. Moderately sloping land extends from the edge of the saltmarsh plain up the slopes of the valley and is dominated by improved agricultural grassland, with significant amounts of wet grassland in places. The saltmarsh is fairly extensive being 0.7 km wide and 1.6 km long. Lackan Bay contains extensive sandflats and in enclosed by a spit with a sand dune system at the seaward end. Part of this site was also surveyed by the Coastal Monitoring Project, which surveyed the sand-dune systems to the north-east of the saltmarsh.

Three Annex I habitats, *Salicornia* flats (1310), Atlantic salt meadows (ASM) (1330), Mediterranean salt meadows (MSM) (1410), are present at this site. All these habitats are listed as qualifying interests for the Lackan saltmarsh cSAC. Nearly the entire saltmarsh habitat is included within the Lackan Saltmarsh and Kilcummin Head cSAC. Some saltmarsh habitat along the landward boundaries is excluded as the 6 inch map shoreline boundary was used to draw the boundaries and there are small errors in rectification between this map and the 2000 aerial photos. A small area of saltmarsh has been excluded in the south-east corner of the site. The cSAC is important for several species of wintering waders and wildfowl.

The western part of the site is fairly easily accessed via a minor road that accesses the shoreline at the north-east end of the saltmarsh. The southern part of the saltmarsh was accessed by crossing farmland (after gaining permission). The western side can also be accessed via the north-west corner of the site.

3 HABITATS

3.1 General description

The saltmarsh is mostly contained in one large main unit. A band of saltmarsh extends along the north-western and north-eastern shorelines of Lackan Bay, which eventually narrow out and transition to sand-dune and sandy beach habitats. There is a typical distribution of Mediterranean salt meadows (MSM) and Atlantic salt meadows (ASM) with ASM occurring at the front (seaward) side of the marsh and MSM occurring at the back of the marsh. Overall, the site is dominated by Mediterranean salt meadows. This habitat dominates the western side of Cloonalaghan River and the southern part of the salt marsh. Atlantic salt meadows occur in the north-eastern section of the saltmarsh and along a narrow band in the north-west area. There are several significant areas of ASM/MSM mosaic with low ASM sward occurring between the large clumps of sea rush (*Juncus maritimus*). Very few patches of '*Salicornia* and other annuals colonizing mud and sand' (1310) were recorded. There are significant patches with common reed (*Phragmites australis*) spreading into the MSM in the south-west section (classified as brackish habitat).

The Cloonalaghan River flows along the northern boundary of the saltmarsh eastwards into Lackan Bay and is eroding the saltmarsh, with a high saltmarsh cliff present. A low ridge containing dry grassland extends from the mid-eastern boundary. Towards the south-east corner there is a mound containing dry grassland, dry heath and some gorse (*Ulex europaeus*) scrub. The boundary along the eastern side is fairly distinct with a sharp transition between the saltmarsh habitats and adjacent improved grassland that develops where the slope begins. There are some narrow bands of wet grassland dominated by yellow flag (*Iris pseudacorus*) creating a diverse transitional habitat. The saltmarsh boundary is less distinct along the southern boundary as there is transitional area with frequent common reed and sea club-rush (*Bolboschoenus maritimus*) stands amongst patches of sea rush (MSM) and disturbed areas of ASM (possibly recovering from recent land reclamation). Occasional clumps of *Schoenoplectus tabernaemontani* also occur in this transitional area. Some of the boundary along the western side is distinct with a sharp transition between common reedbeds and the sea rush stands. Along other parts of the boundary there is a transition between sea rush and soft rush (*Juncus effusus*) (wet grassland) where a low slope develops, indicating the saltmarsh boundary. There are usually fences or overgrown hedgerows along the saltmarsh boundary. Gorse-dominated scrub extends into the saltmarsh along enclosure edge/drains on low ridges/ditches in the north-west section.

Table 3.1. Area of EU Annex I habitats listed at Lackan.

EU Code	Habitat	Area (ha)
1310	*Salicornia* and other annuals colonizing mud and sand (1310)	0.001
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	28.27
1410	Mediterranean salt meadows (Juncetalia maritimi)	66.00
	Total	**94.27**

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

While this site is listed for this Annex I habitat, very little of this habitat was recorded. Only several small patches (1-3 m in diameter) containing glasswort (*Salicornia* sp.) were present on sand and mud banks located in some of the large creeks and the Cloonalaghan River channel within the saltmarsh. No glasswort was recorded on the intertidal sandflats.

3.3 Atlantic salt meadows (H1330)

This habitat is mainly found in the north eastern section of the saltmarsh. Several different ASM plant communities reflecting zonation are present. This area contains a typically well-grazed short ASM turf. The front of the marsh is dominated by a sea pink (*Armeria maritima*) and sea plantain (*Plantago maritima*) sward. Other frequent species in this turf include sea milkwort (*Glaux maritima*), common saltmarsh-grass (*Puccinellia maritima*), red fescue (*Festuca rubra*) and saltmarsh rush (*Juncus gerardii*). Occasional species include glasswort, annual sea-blite (*Suaeda maritima*), common scurvygrass (*Cochlearia officinalis*) and sea arrowgrass (*Triglochin maritimum*).

There are also significant patches of vegetation dominated by red fescue/saltmarsh rush on slightly raised mounds occurring further back in the ASM. This vegetation type also contains many of the species listed above in addition to sea aster (*Aster tripolium*), greater sea-spurrey (*Spergularia media*), buck's-horn plantain (*Plantago coronopus*) and long-bracted sedge (*Carex extensa*).

There is additional internal zonation of vegetation along the creeks with narrow bands of common saltmarsh-grass-dominated vegetation developing. These bands occasionally develop on 'steps' or lower ground at the edge of the creek. This vegetation type also occurs at the seaward boundary along the north-east corner of the site. There is frequent glasswort and occasional annual sea-blite associated with these areas.

The saltmarsh topography is well developed with salt pans of all sizes occurring all through the habitat. Some of these are unusually very deep. The creek network is also well-developed. There are also patches of ASM in a mosaic area dominated by sea rush in the south-east section. This ASM is not grazed significantly. ASM is also frequent along the edges of the larger creeks and the main river channel.

ASM also occurs along the western side of Lackan Bay. It occurs in mosaic with some fixed dune grassland on some of the higher mounds and there are patches of embryonic dune developing in this area as well. The saltmarsh is developing on sand in this area. Species such as sand sedge (*Carex arenaria*) occur here on the marsh.

3.4 Mediterranean salt meadows (H1410)

This habitat dominates the saltmarsh. At the front of the marsh there are several well-defined clumps of dense sea rush present amongst the ASM and develop on slightly raised ground. The MSM becomes more frequent further back in the marsh and develops along the landward boundaries. Other frequent species include creeping bent-grass (*Agrostis stolonifera*), red fescue (*Festuca rubra*) and saltmarsh rush. Other occasional species include autumn hawkbit (*Leontodon autumnalis*), sea milkwort, sea aster, sea arrowgrass, common scurvygrass and sea plantain. Other species recorded include long-bracted sedge, lax-flowered sea lavender (*Limonium humile*), spear-leaved orache (*Atriplex prostrata*) and parsley water-dropwort (*Oenanthe lachenalii*). The occurrence of lax-flowered sea lavender in this habitat is notable as it was not recorded here before. A spike-rush sp. (*Eleocharis* sp.) was also recorded in an area with some freshwater influence. The creek and pan topography is very well developed with frequent pans and a dense network of creeks. Many of the creeks contain very soft mud and are quite deep.

Dense stands of sea rush occur to the west of Cloonalaghan River. There are patches of almost 100% monocultures of sea rush. Some mounds along the western side contain species such as white clover (*Trifolium repens*), common bird's-foot trefoil (*Lotus cornicultans*) and silverweed (*Potentilla*

anserina) indicating the ground level is close to the terrestrial transition. Common reed begins to spread into the MSM along the western side and where it is frequent it is classed as brackish habitat.

4 IMPACTS

There have been drainage works in the past (810) with regular-spaced drains across the north-western section of the saltmarsh linking drains from adjacent wet grassland on slopes to the Cloonalaghan River. The western boundary has a significant freshwater/brackish influence along the edge of the saltmarsh that probably has been influenced by the old drainage works. Spoil from drains across the saltmarsh has been deposited on the saltmarsh and forms low ridges. These drains are also likely to have been deepened/cleaned in the past. The original creek network in this area has been affected by this drainage. Some of the channels in the mid-eastern part of the saltmarsh have probably been artificially deepened and straightened in the past.

There has been some land reclamation in the past (802), particularly in the south-west along the upper part of the Cloonalaghan River (outside the cSAC) and along the southern and western sides. Some of this land has probably reverted back to saltmarsh (although it has been disturbed). This drainage and land reclamation is relatively old and is not considered in the current impacts (although is probably having some residual impact).

Sheep graze the eastern side of the saltmarsh (140). The grazing level on the ASM is moderate overall, with a short turf being formed. However, poaching occurs in small localised areas and overgrazing (striping plant cover) is not present. The grazing level is low-absent in the MSM as the dense patches of sea rush protect the other vegetation. The level of grazing decreases towards the southern end of the marsh. Parts of the western side of the marsh are grazed by cattle but overall the grazing level is low. There is significant cattle grazing and poaching in a small area (enclosure) (142) in the north-eastern corner.

There are vehicle tracks and wheel ruts on the ASM at the north-western and north-eastern corners of the saltmarsh, where the minor roads allow access to the sandflats and Lackan Bay (501). The NHA survey notes indicate that the cSAC is used for hunting and this probably includes the saltmarsh as Snipe and other wetland birds roost on the saltmarsh.

The saltmarsh is probably affected by agricultural run-off from the adjacent farmland, as the saltmarsh occurs in a basin (701). This leads to nutrient enrichment of the marsh but its impact is difficult to assess. Nutrient enrichment may lead to the spread of common reeds but the saltwater influence of the tide will act to restrict its spread.

Natural erosion (900) is occurring along northern saltmarsh boundary, as the Cloonalaghan River channel is situated along the edge of the saltmarsh. The river has caused significant erosion of the saltmarsh cliffs indicated by a comparison of the 2000 aerial photos and 1929 6 inch map. Between 20-40 m of saltmarsh has been eroded away on both sides of the saltmarsh (but mainly on the eastern side) during this period (2.8 ha). A comparison of the GPS mapping with the 2000 aerial photo indicates that 2-3 m has been eroded in this period (0.1 ha). The erosion is being caused by shifts in the Cloonalaghan River channel, which previously flowed through the central part of Lackan Bay, but now flows along the eastern side of the bay. Some accretion is currently occurring at present on the northern side of the river channel.

A comparison of the 2000 aerial photos and 1929 6 inch map indicates that new saltmarsh has developed (910) along the western side of Lackan Bay extending along the shoreline from the main area of saltmarsh (2.9 ha). These erosion/accretion cycles are natural reactions to geomorphological changes within Lackan Bay. The recently developed saltmarsh probably along the western side of Lackan Bay compensates for the area lost by erosion. This area is likely to be eroded in the future as the river channel shifts again. The erosion and accretion mainly affects the ASM. Some minor erosion and accretion also occurs within the MSM further up the river channel.

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

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
13s	140	C	-1	30	Inside
1410	142	A	-1	6	Inside
1330	501	C	-1	< 0.1	Inside
13s	701	C	0	94.27	Outside
1330	900	B	0	N/A	Inside
1330	910	C	0	0.1	Inside
1410	900	C	0	N/A	Inside
1410	910	C	0	N/A	Inside

[1] EU codes as per Interpretation Manual. Code 13s is an additional code used to signify the entire saltmarsh habitat.
[2] Description of activity codes are found in Appendix III summary report.
[3] Intensity of the influence of an activity is rated as A = high, B = medium, C = low influence and D unknown.
[4] Impact is rated as –2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1= natural positive influence and +2 = strongly managed positive influence.
[5] Location of activity: Inside = activities recorded within and directly impacting the saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

Overall, the conservation status of this site is favourable (Table 5.1). There are some current negative impacts and activities such as heavy cattle poaching or vehicle damage, but these are localised to relatively small areas in comparison to the whole marsh. Sheep grazing, while being more extensive, is not having a significant negative impact on the saltmarsh. Drainage and land reclamation has had significant impacts in the past and is probably still having some residual impacts. However, these impacts pre-date the current period for assessment.

Natural erosion is occurring along the northern boundary in response to shifts in the position of the Cloonalaghan River channel. However, this erosion is being compensated by accretion creating new saltmarsh in other parts of Lacken Bay, specifically along the western boundary and in the north-eastern corner of the saltmarsh.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are moderate. There are natural transitional habitats, such as reedbeds, brackish areas and wet grassland bordering about 70% of the landward saltmarsh boundaries on relatively to low slopes. These areas will allow some medium-term migration of saltmarsh habitat. Saltmarsh already occurs adjacent to moderately-sloping land in the north-eastern section so there is less scope here for saltmarsh migration.

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

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

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

This habitat was assessed as unfavourable as no areas of any significance were recorded. This Annex I habitat was probably listed for this site due to records of glasswort and annual sea-blite occurring on the saltmarsh in association with other saltmarsh species. However, the pioneer saltmarsh community dominated by common saltmarsh-grass and containing frequent glasswort is classified as ASM for the purposes of this survey. No large areas dominated by glasswort on sand or mud were recorded during this survey (a small area 1-2 m long was recorded in the Cloonalaghan River channel). There is no information to indicate that the area of *Salicornia* flats was more significant in the past.

This habitat could be expected to be more extensive in a site of this size. However, the location of the Cloonalaghan River channel along the northern boundary of the saltmarsh has eliminated any pioneer plant communities or raised sand bars where this habitat would be expected to develop. Small patches are likely to develop along the Cloonalaghan River channel within the saltmarsh.

5.3 Atlantic salt meadows (H1330)

5.3.1 Extent

The extent is assessed as *favourable* as there has been no overall loss of habitat to erosion. Losses of habitat along the northern boundary are being compensated by the creation of new ASM along the western boundary of Lackan Bay and at the north-east corner of the saltmarsh.

5.3.2 Habitat structure and functions

Nine monitoring stops were carried out in the ASM and all passed. Therefore, the overall structure and functions of this habitat is assessed as *favourable.*

The ASM has adequate habitat structure and functions. Sheep grazing has created a typical low sward (1-2 cm high). However, species diversity has not been affected and is typical of this habitat. Poaching is only localised or at a low level. Further back in the saltmarsh grazing is not as significant and there are patches of taller ASM (0.4 m high). Zonation is evident with the typical low/mid and upper ASM saltmarsh plant communities present. There are mosaics present with MSM that could be considered transition areas between the two habitats. There minor areas with some natural transitional habitats to wet and dry grassland, and fixed dune grassland. (Most of the transitional saltmarsh habitat occurs alongside MSM.) Common cordgrass (*Spartina anglica*) was not recorded on this site.

5.3.3 Future prospects

The future prospects of the ASM are assessed as *favourable* in the short term, assuming the current grazing regime is continued, sheep stocking rates are not increased and heavy poaching by cattle remains limited.

5.4 Mediterranean salt meadows (H1410)

5.4.1 Extent

The extent is assessed as *favourable* as there has been no overall loss of habitat to erosion. There have probably been some losses in the past to drainage and land reclamation but there have been no recent losses.

5.4.2 Habitat structure and functions

Eight monitoring stops were carried out in the MSM and seven passed. Therefore, the overall structure and functions of this habitat is assessed as *unfavourable-inadequate*. The only stop that failed, failed due to heavy poaching damage with the target for plant ground cover not being reached. The area affected by the heavy poaching is about 10% of the total area of MSM.

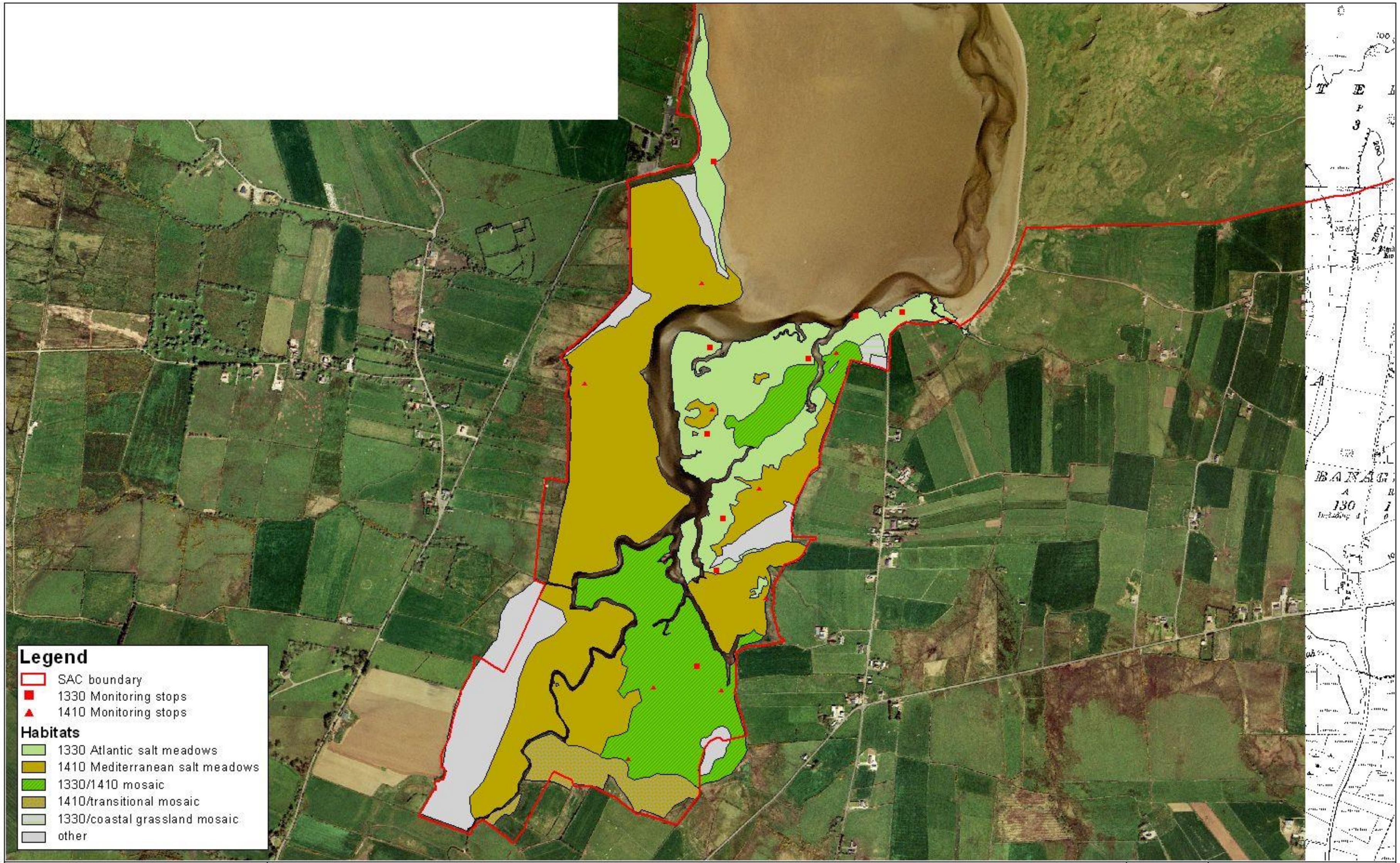
The MSM in general has adequate habitat structure and functions. Grazing is not significantly affecting the MSM, as the dense Rush sward protects the other species to some extent. Species diversity is typical of this habitat. There are mosaics present with ASM that increase the structural diversity. There are significant transitional habitats to wet and dry grassland, and fixed dune grassland. (Most of the transitional saltmarsh habitat occurs alongside MSM).

5.4.3 Future prospects

The future prospects of the MSM are assessed as *unfavourable-inadequate* in the short term, assuming the current grazing regime is maintained. Reduction of cattle grazing is required in some of the enclosures in the north-west of the site to prevent further poaching and allow the saltmarsh to recover somewhat.

6 MANAGEMENT RECOMMENDATIONS

Monitoring is required to prevent potential further land reclamation and infilling. Deepening or cleaning of drains and creeks on the saltmarsh is also potentially likely in the future. The current grazing levels are not affecting the saltmarsh significantly overall, apart from the heavily poached area in the north-west section of the saltmarsh.



Saltmarsh Monitoring Project

Lackan

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 5953)

Níl sna teorainneacha ar an léarscáil seo ach nod garshuíomhach ginearálta. Féadfar athbhreithniú a dhéanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordonáis le chead ón Rialtas. (Ceadúnas Uimh. 5953)

Lackan saltmarsh and Kilcummin Head cSAC (000516)

SMP Code: SMP0022

Map produced by: **SMP 2006**

Map Version: **1**

0 0.2 0.4 0.6 0.8 Kilometers

N

Scale: **1:10198**

Appendix IV – Lackan site report and habitat map for sand dune habitats from the Coastal Monitoring Project (Ryle *et al*., 2009)

Lackan

SITE DETAILS

CMP06 site name: Lackan **CMP06 site code:** 129 **CMP Map No.:** 126

County: Mayo **Discovery map:** 24 **Grid Reference:** G 197 370

6 inch Map No.: Ma 8 & 15

Aerial photographs (2000 series): O0944-B,C,D; O0945-D; O1000-A,B

NPWS Site Name: Lackan Saltmarsh and Kilcummin Head

NPWS designation: **pNHA:** 000516 **cSAC:** 000516

Ranger Area: Mayo

MPSU Plan: No

Report Author: Kieran Connolly

SITE DESCRIPTION

Lackan (Carrowsteelagh) sand dunes are in Lackan Bay, on the Northwest corner of Killala Bay in North Mayo. The beach and sand dunes form the seaward part of a small cSAC (Lackan Saltmarsh and Kilcummin Head) that extends southwards to encompass a large estuary containing intertidal sand flats and an extensive saltmarsh. The saltmarsh includes both Atlantic and Mediterranean type marsh vegetation. Also included in the site are rocky shores and low cliffs and the open sea area between Kilcummin Head and a point on the opposite (western) side of Lackan Bay (marked by a pier).

The north-facing sand dune boundary extends over approximately 2km. The western side of the sand dunes is a spit that lies to the landward side of Lackan Strand, while the eastern side of the dunes extends into higher ground to the south of Kilcummin Head. The west-facing sand dune boundary extends over approximately 1.2km of shoreline, on the northeast boundary of the large estuary. The Cloonalaghan River flows through the estuary and enters the sea on the western side of the dunes. The course of the river channel may change over time - as can be seen by comparing the current course with that on the site 6' map - and can clearly be a factor in shaping the sand dunes.

The southern boundary of the cSAC (in the sand dune part of the site) is along a fence and stone wall. This boundary also adequately represents the limit of sand dune habitats at the site, except for a sizeable area of fixed dunes in the southwest corner. There is also an adjacent area of peaty and clay soil (indicated by a 'miscellaneous' point on the site digital map) that extends into the cSAC, and is excluded from the mapped fixed dune area.

The eastern end of the dune grassland was not fully surveyed due to the presence of a bull in this part of the dunes during the site visit. It is mapped as fixed dune throughout, although the elevated ground and distance from the main sediment source at the eastern extreme suggest that sand cover may become intermittent from some distance westwards of the boundary. There is also some particularly high rocky ground in the south of the site, the western end of which is indicated on the site digital map

with a 'miscellaneous' information point, that did not have a continuous substantial sand cover. Nevertheless, the entire area is mapped here as fixed dune, with a separate polygon on the site map to identify the area that probably has a discontinuous or less substantial sand cover. A more precise mapping of the eastern fixed dune extremity may result from a future unhindered survey.

There is a small adjunct to the main site on the northwest side of Lackan Bay, which, due to its isolation from the main sand dune area, is treated here as a sub-site. It is referred to as 'Rathlackan', after the nearest townland indicated on the relevant 'Discovery' series map. This small sand spit, consisting mostly of fixed dune grassland and some small areas of both embryonic dunes and mobile dunes, is of little conservation interest due to the intensive livestock rearing management of the area.

Although there are only a small number of Annex I sand dune habitats at Lackan and the Rathlackan sub-site (Table 129A), the total area is dominated by a large expanse of fixed dunes – a priority Annex I habitat. The dunes and beaches were estimated as covering 29% (or 156ha) of the total cSAC area of 540ha in the site NATURA 2000 standard data form.

The site NHA files refer to a small area of machair at the saltmarsh/sand dune boundary. However, Lackan was not listed as a machair site on the NPWS sand dune site inventory and the area in question was seen to support only saltmarsh vegetation when investigated during the present survey.

Table 129A Areas of EU Annex I habitats mapped at Lackan

EU Code	EU Habitat	Area (ha)
Lackan Dunes		
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	2.543
H2130	Fixed coastal dunes with herbaceous vegetation	99.860
	Total Sand dune	**102.403**
Rathlackan Dunes		
H2110	Embryonic shifting dunes	0.066
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	0.283
H2130	Fixed coastal dunes with herbaceous vegetation	3.511
	Total Sand dune	**3.86**

The main sand dune site on the eastern side of the Bay is accessible along a public road at the north end, where there is a small car parking area. Reaching the site, however, from any of the local population centres requires travelling some distance on minor roads, which probably has an effect in suppressing visitor numbers. The Rathlackan sub-site is also easily accessed, although like the main site, is in a somewhat isolated location. The dunes are approximately 5km to the northwest of Ross sand dunes (included in this report as site 130) which are within the Killala Bay/Moy Estuary cSAC (000458).

Fixed Dunes (H2130)

<u>Lackan</u>

The survey of the fixed dunes was curtailed somewhat by the presence of a bull among the cattle herd that occupied the eastern side of the site on the survey date. The most easterly fixed dune monitoring stop (included in the 'monitor' theme on the site digital map) roughly marks the easternmost point of the area covered during the site visit. The inner part of the dunes is unfenced and the livestock have

free movement throughout the fixed dune area. Livestock grazing is the dominant land usage and the cattle herd consisted of 52 animals at the time of the survey, although this is a somewhat lower number than previous years, according to information received from the herd owner.

The localised proliferation of species such as *Cirsium arvense* (creeping thistle) and *Senecio jacobaea* (common ragwort) may be indicative of recent overgrazing or intensive management, although currently there would appear to be a trend towards undergrazing. However, much of the dune grassland is reasonably intact and of good conservation value. Species diversity was generally high throughout the site and a number of monitoring stops had in excess of 20 species.

The more commonly noted species included *Anacamptis pyramidalis* (pyramidal orchid), *Carex arenaria* (sand sedge), *C. flacca* (glaucous sedge), *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), *Pilosella officinarum* (mouse-ear-hawkweed), *Plantago lanceolata* (ribwort plantain), *Rhinanthus minor* (yellow-rattle), *Thymus polytrichus* (wild thyme) and *Veronica chamaedrys* (Germander speedwell).

Other species noted included Crepis capillaris (smooth hawk's-beard), *Dactylorhiza* (orchid) sp., *Koeleria macrantha* (crested hair-grass) and *Viola tricolor* ssp. *curtisii* (wild pansy). There were occasional stunted *Crataegus monogyna* (hawthorn) shrubs in the dune grassland, although the total shrub and tree cover was insignificant.

Two of the more interesting species noted were *Listera ovata* (twayblade) and the parasitic *Cuscuta epithymum* (dodder). The presence of *Cuscuta epithymum* (dodder) and other species such as *Anacamptis pyramidalis* (pyramidal orchid) reflects the calcareous nature of the site. Previous studies that determined notably high carbonate levels were reported in the explanatory notes that accompany the NATURA 2000 standard data form for the site.

Bryophyte cover was notably high through much of the dune grassland. The more common species noted included *Climacium dendroides*, *Homalothecium lutescens*, *Hypnum cupressiforme*, *Rhytidiadelphus squarrosus, R. triquetrus* and *Tortula ruraliformis*.

The north-facing side of the dunes has suffered quite severe erosion in recent times, as is clear from the very steeply eroded front face that now characterises much of this stretch. There is no substantial foredune habitat along here, and clumps of fixed dune vegetation have slumped down onto the front face of the dunes in considerable abundance. In places the slumped fixed dune vegetation is stabilised by *Ammophila arenaria* (marram). Occasional patches of freshly accreting marram at the foot of the steep front face were insubstantial and probably only temporary in nature. Such is the eroded nature of the system that in places along the north-facing strand, the top of the front face of the dunes is approximately 10m over the beach level.

Along the western boundary of the site that faces into the estuary, the dunes rise more gently from the beach level, although there is also some slumping of fixed dune vegetation here also, probably at least partly due to the erosive action of the Cloonalaghan River that flows in a wide channel along the western side of the dunes, before entering the sea at Lackan strand.

Rathlackan

The fixed dune grassland in the sub-site of Rathlackan has been greatly disrupted by intensive livestock rearing practices and retains little of conservation interest.

A fence (the location of which is identified with a 'miscellaneous' point on the site digital map) running across the width of the spit forms a boundary between the grazed and ungrazed parts of the grassland. North of the fence is grazed and is characterised by a short, mostly marram-free sward, while the ungrazed southern tip of the spit contains abundant marram. A small band of semi-fixed dunes at the south tip of the spit is defined on the site digital map by an individual polygon on the habitats theme. The more severely eroded condition of the northern part of the spit can be clearly seen on the site aerial photographs.

The more intensively managed areas also contain a relatively high cover of weed species – particularly *Senecio jacobaea* (common ragwort) – while coarse grasses such as *Dactylis glomerata* (cock's-foot) also proliferate.

Mobile Dunes (H2120)

Lackan

Although mobile dunes are mapped along the full northern edge of the spit, the characteristic vegetation – in this case *Ammophila arenaria* (marram) - is frequently quite sparse and/or unhealthy, reflecting the lack of mobility in the zone. Only at the western tip of the spit, where accreting or locally recycled sediment accumulates, is there a substantial band of healthy *Ammophila arenaria* (marram). Large clumps of fixed dune vegetation have slumped onto significant areas of the generally very steep front face of the dunes. In places, the slumped vegetation has been stabilised by the presence of marram. Due to the sparse distribution and unhealthy appearance of marram and the general lack of sediment mobility along much of the seaward edge of the dunes, mobile dunes could, with equal justification, have been omitted from all but the more westerly reaches of the spit for the purposes of habitat mapping.

Rathlackan

Mobile dunes at Rathlackan extend around the seaward edge of much of the spit. Amounting in total to only 0.283ha, the habitat was characterised by the presence of *Ammophila arenaria* (marram). Also present in places was *Leymus arenarius* (lyme–grass), although this, like some of the marram present, appeared to owe its existence there to dune protection works that involved planting the pioneer grasses into heaped and stabilised sand and cobble banks.

Embryonic Dunes (H2110)

Rathlackan

The only embryonic dunes mapped at the site were at Rathlackan on the western side of Lackan Bay and here the total habitat area amounted to only 0.066ha. The small strip of habitat was recorded from the sheltered western side of the spit and may have formed from the apparent redistribution of sediment from the larger spit (Lackan) on the other side of the estuary. The sandhills at Rathlackan are also badly eroded, which has resulted in the availability of sediment that may be re-worked to form temporary foredune habitat.

IMPACTS

Activities observed or known to be impacting on the sand dune habitats at Lackan (including the sub-site at Rathlackan) are shown in Table 129B.

Table 129B Intensity and impact of various activities on sand dune habitats at Lackan

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of Activity[5]
H2130	103	B	-1	20	Inside
H2130	140	A	+2	90	Inside
H2130	149	C	-1	10	Inside
H2130	400	A	-2	0.5	Inside
H2130	421	C	-1	0.2	Inside
H2120	622	C	-1	2	Inside
H2120	871	A	0	0.1	Inside
H2130	871	B	+2	3	Inside
H2110	900	A	0	Unknown	Inside
H2120	900	A	0	Unknown	Inside
H2130	900	A	0	5	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 dunes have been grazed by cattle (code 140) in recent years. On the site survey date, 52 animals were present, although this figure is somewhat lower than in previous years. The presence of significant populations of species such as *Cirsium arvense* (creeping thistle) and *Senecio jacobaea* (common ragwort) are indicative of previous overgrazing, although the current lower stocking densities and the presence of significant areas characterised by a long sward suggest a trend towards undergrazing (code 149). The eastern side of the dunes at Lackan were not fully investigated due to the presence of a bull in the cattle herd occupying this area during the site visit. However, there are no internal fences within the dune grassland, which suggests that the activities and impacts are probably fairly constant throughout the site.

Rabbits were present at the site, although the population, estimated by the number of burrows seen, did not appear to be excessive.

The north-facing (seaward) side of the spit has a highly eroded dune face (code 900), which, coupled with the lack of any substantially accreting habitat, suggests the system is being depleted of sediment. Occasional patches of freshly accreting marram at the foot of the steep front face were insubstantial and probably only temporary in nature. A wider band of healthy marram at the west tip of the spit reflects the movement of locally re-worked sediment in this direction. It is not clear to what degree human activities may have contributed to erosion in recent times, but the scale of events suggests that natural causes, such as wind and wave action, must be mostly responsible.

The NATURA 2000 standard data form and explanatory notes for the cSAC suggest that recreational pressures have increased in recent times, although there are apparently no data to quantify any such increase. They further note, however, that the dunes seem to escape most of the pressures of amenity use, as walking and other associated activities (code 622) are mostly concentrated on the beach areas. This is certainly at least in part due to the fencing around the dune edge and the presence of grazing stock in the dune grassland. Gates at the eastern end of the dunes have signs advising visitors of the presence of potentially dangerous animals.

A new house (not on the site aerial photograph) appears to have been constructed at the extreme eastern end of the site. The location is marked as an information point on the site digital map (code 400).

At Rathlackan sub-site on the northwest side of Lackan Bay, there appeared to have been some attempts at dune protection (code 871), through the planting of *Ammophila arenaria* (marram) and *Leymus arenarius* (lyme–grass) on heaped banks of sand and cobbles. The eroded nature of the spit (clearly visible on the site aerial photographs) had left it in imminent danger of being breached in storms.

Some small scale littering (code 421) was noted in the fixed dunes at Lackan.

Watersports activities were observed on the survey date, although these activities are unlikely to have any direct impact on the sand dune habitats.

The activities recorded in the NATURA 2000 standard data form were grazing, walking and associated activities, and hunting. Hunting was adjudged to be of low influence and to affect 20% of the total cSAC area. There was no evidence from the present survey that this activity relates to the sand dune portion of the site.

CONSERVATION STATUS

The overall conservation status assessment of each habitat at Lackan and Rathlackan is based on a combination of *Habitat Extent*, *Structure & Functions*, and *Future Prospects* assessments (Table 129C). The structure and functions assessment of habitats is generally determined by the percentage pass rate of monitoring stops carried out in the habitats (Table 129D). Monitoring stops were not carried out at Rathlackan due to its small size and the lack of conservation interest that is mostly due to the degraded condition of the sand hills.

As Lackan sand dunes are the only dune system within the cSAC, all information on the system in previous reports, such as the NATURA 2000 standard data form and associated explanatory notes, refers directly to the site. Nevertheless, the methods used in generating area measurements differ greatly from those employed here, and are of little use for the purposes of comparison. Therefore, and notwithstanding the fact that observations on erosion and recreational pressures on the site from previous reports can prove useful, the conservation status assessments in the present report were largely based on the current condition of habitats.

Fixed Dunes (H2130)

Lackan

Extent (area) is rated as *favourable* as there do not appear to have been any recent losses of habitat that may be conclusively attributed to human-induced pressures. Although a new house has been constructed at the extreme east end of the site (i.e. since the production of the 2000 series aerial photographs) the area immediately surrounding the house is mapped here as agricultural land as it has been sufficiently modified as to no longer warrant inclusion within the functioning sand dune area. It was assumed that this has been the case for some time. In addition, this area was not fully surveyed

due to the presence of a bull in the eastern end of the site. A future, more thorough, survey may result in a revision of the eastern and south-eastern boundaries of the fixed dune area.

Of the eight monitoring stops carried out in the habitat, seven reached the minimum standard required for a pass rating. One monitoring stop, in the north-west corner of the main site failed on the basis of an excessive cover of negative indicator species - in this case, both *Cirsium vulgare* (spear thistle) and *Senecio jacobaea* (common ragwort) - and a lack of species-rich short sward. An overall monitoring stop failure rate of less than 25% indicates *unfavourable – inadequate* structure and functions (Tables 129C&D). The spacing of the monitoring stops throughout the site was restricted somewhat by the presence of a bull in the eastern end of the site during the site visit as the surveyors were advised by the herd owner to maintain a safe distance. Future monitoring of the site should incorporate a more even spacing of monitoring stops throughout the entire habitat.

Table 129C Conservation status of Annex I sand dune habitats at Lackan

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

Future prospects are assessed as *unfavourable-inadequate*, due primarily to an apparent recent trend towards undergrazing in the habitat, and damage caused by intensive agricultural management practices in the eastern end of the site. The threats to the future integrity of the habitat are not considered severe, so an *unfavourable-bad* assessment is not thought appropriate.

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 of assessment is *unfavourable-declining* (Table 129D), as there has apparently been a recent trend towards undergrazing. The system is also showing signs of sediment depletion, with little or no significant foredune development.

Rathlackan

The negative impacts of intensive livestock rearing practices at Rathlackan are probably largely confined to the structure and functions elements of the conservation status assessment. There is no clear evidence of a recent decline in area, despite fact that the whole spit seems in danger of breaching. Extent is therefore considered to be *favourable*.

Much of the grassland area of Rathlackan is quite weedy, with *Senecio jacobaea* (common ragwort) particularly common. Grasses such as *Dactylis glomerata* (cock's-foot) and *Poa trivialis* (rough meadow-grass) dominate much of the area, and diversity of typical dune grassland species is low throughout. The poor condition of the habitat may be attributed to the livestock rearing practices that have taken place and continue to take place here. As a result of this poor condition, structure and functions are considered *unfavourable-bad*.

Future prospects may also be considered *unfavourable-bad* as the intensive livestock rearing practices that have compromised the conservation value of the sand hills are likely to continue.

As both structure & functions and future prospects are rated as *unfavourable-bad*, the overall conservation status assessment is also *unfavourable-bad*.

The assessment thought most appropriate in the proposed Irish system is *unfavourable-unchanged*, reflecting the probable long-term continuation of intensive agricultural use of the area.

Mobile Dunes (H2120)

Lackan

Although mobile dunes were mapped along the full length of the spit, much of the habitat was almost bare of vegetation (with numerous large bare patches on the steep front dune face) and consisted of unhealthy plant material that reflected the lack of sediment mobility through much of the zone. Mobile dunes, could, with equal justification, have been omitted from much of the eastern part of the dunes on the habitat map produced here. Therefore, based on the current condition of the habitat, extent (area) is rated as *unfavourable-bad*.

Four monitoring stops were carried out in mobile dunes at the main site area, of which only two reached the minimum target requirements. A 50% pass rate indicates *unfavourable–bad* structure and functions (Tables 129C&D). The two failed stops reflected the substantial areas in which sediment mobility was obviously poor and in which much of the characteristic vegetation was unhealthy.

Table 129D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Lackan

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Lackan*			
Fixed Dunes (H2130)	7	1	**Unfavourable - Inadequate**
Mobile Dunes (H2120)	2	2	**Unfavourable - Bad**

* Monitoring stops were not carried out at Rathlackan

Future prospects for the habitat are considered *unfavourable–bad*, due to the on-going erosion and apparent sediment depletion that have reduced the foredunes to very limited extent and poor condition.

As all of the individual parameters of conservation status are *unfavourable–bad*, the overall assessment for the habitat is also *unfavourable–bad.*

The chosen rating under the corresponding proposed Irish system of assessment is *unfavourable–declining*, reflecting the on-going use of the area for intensive agricultural use.

Rathlackan

Extent (area) is considered *unfavourable-inadequate* due to the limited area and poor zonation of habitat. A significant area of habitat also appears to have originated in dune protection works that included the planting of foredune grasses. This interruption of the natural dynamics in a dune system should be considered as a negative development and reinforces the negative assessment.

Structure and functions are considered *favourable*, as most of the *Ammophila arenaria* (marram) material in the habitat was healthy, and negative indicator species cover was not excessive. The redistribution of sediment from Lackan dunes on the other side of the estuary may provide a sufficient input of sand to support healthy growth of the habitat typical species.

Despite the fact that sediment appears to redistribute from Lackan dunes on the other side of the estuary to Rathlackan, future prospects are considered *unfavourable – inadequate* due to the overall sediment depletion from which the system now appears to suffer. There is currently little likelihood of any substantial permanent accretion of foredune habitats.

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

As the habitat can be assumed to have been in similar condition for some time - due to intensive land management and the apparent lack of sediment input into the system - the assessment thought most appropriate under the proposed Irish system of assessment is *unfavourable-unchanged.*

Embryonic Dunes (H2110)

Rathlackan

Only a very small area of embryonic dunes was mapped at the Rathlackan sub-site on the western side of Lackan Bay. Although there are no recent data on habitat extent with which to compare the current area, the very limited development and poor zonation of habitat suggests an *unfavourable-bad* assessment is the most appropriate. Comparison with the site 6' map (included as a theme on the site digital map) shows a considerable retreat by the dune system from former habitat boundaries. Particularly noticeable is the markedly different profile of the sand hills on the west (landward side). However, due to the considerable time lapse between the production of these maps and the present date, which is sufficient for numerous cycles of erosion and accretion to have occurred, they are not taken into account when assessing habitat extent.

Due to the almost negligible size of the habitat, monitoring stops were not necessary for the assessment of conservation status. However, as the small area of vegetation was generally comprised of healthy and robust *Elytrigia juncea* (sand couch), structure and functions are rated as *favourable*.

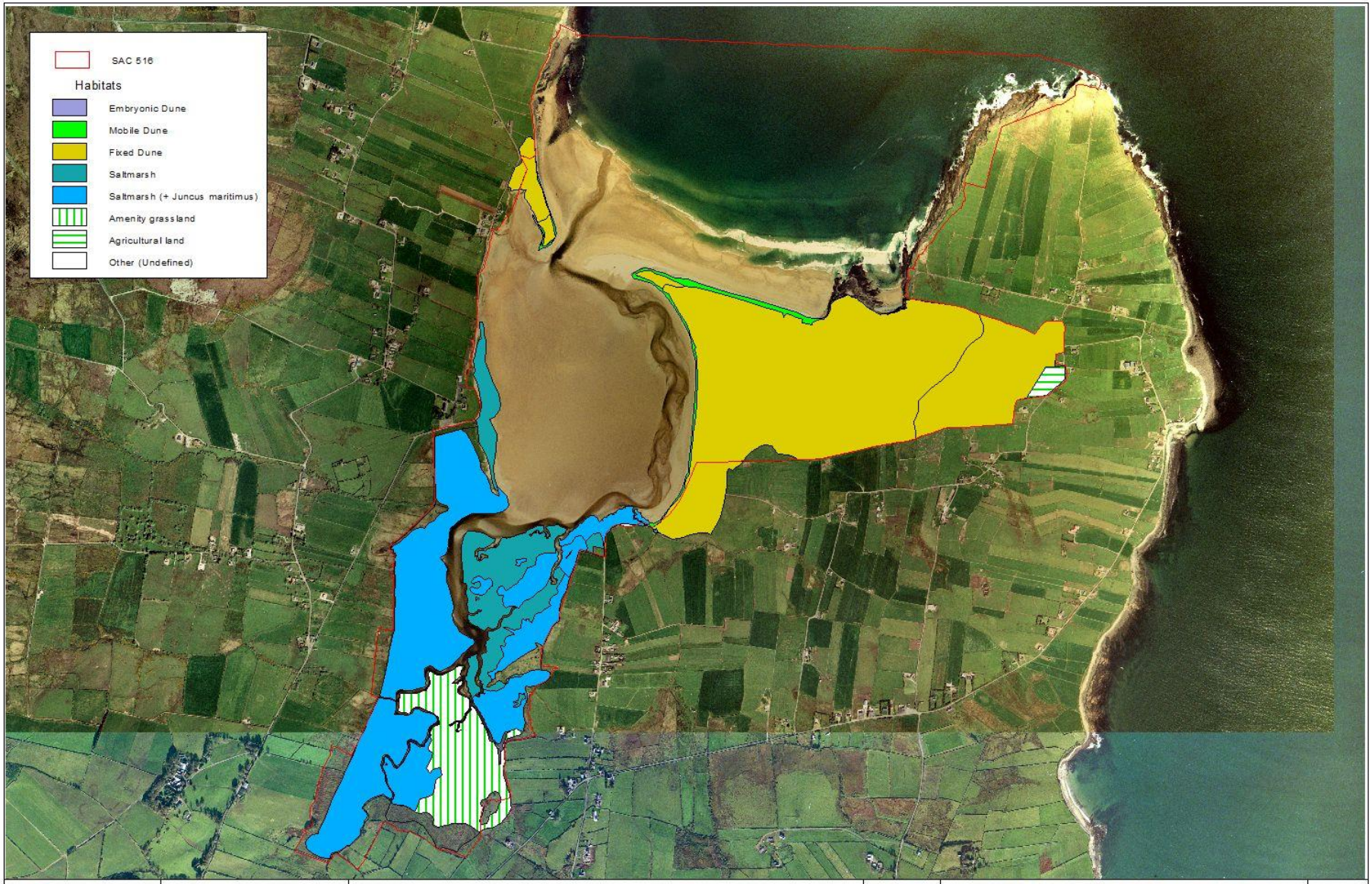
Because of the eroded and damaged nature of this small spit, and the threat of severe breaching during storms, the embryonic dunes must be regarded as having *unfavourable-bad* future prospects.

As both extent and future prospects are rated as *unfavourable-bad*, the overall conservation status assessment is also *unfavourable-bad*.

As the habitat can be assumed to have been in similar condition for some time - due to intensive land management and the apparent lack of sediment input into the system - the assessment thought most appropriate in the proposed Irish system is *unfavourable-unchanged*.

Lackan

There were no embryonic dunes at Lackan during the current survey.



Coastal Monitoring Project 2004-2006

Lackan

CMP code: 129

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Lackan Saltmarsh and Kilcummin Head (SAC 516)

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)

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