Streedagh Point Dunes SAC (site code 1680)
Conservation objectives supporting document -coastal habitats

NPWS

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Please note that the opinions expressed in the site reports from the Saltmarsh Monitoring Project (SMP) 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 (2015). Conservation Objectives: Streedagh Point Dunes SAC 001680. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

1 Introduction

Achieving Favourable Conservation Status (FCS) is the overall objective to be reached for all Annex I habitat types and Annex II species of European Community interest listed in the Habitats Directive 92/43/EEC (Commission of the European Communities, 2007). It is defined in positive terms, such that a habitat type or species must be prospering and have good prospects of continuing to do so.

Streedagh Point is located in north Co. Sligo near the village of Grange and 14km north of Sligo Town. It represents one of only three shingle based dune systems in the country (Moore & Wilson, 1999). The site is a fine example of a tombolo formation with a shingle spit overlain by sand dunes joining Connors Island to Streedagh Point. The landward side of the site comprises an area of sand flats, the estuary of the River Grange. The underlying bedrock is of stratified sedimentary rocks – argillaceous and oolitic limestones, conglomerates and chert; some are rich in fossils. The site is of importance for ecological, geological and geomorphological reasons.

Streedagh Point Dunes SAC (site code: 1680) is designated for a range of coastal habitats including vegetated shingle, saltmarsh and sand dunes. The following five coastal habitats are included in the list of qualifying interests for the site:

- Perennial vegetation of stony banks (1220)
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330)
- Mediterranean salt meadows (*Juncetaliea maritimi*) (1410)
- Shifting dunes along the shoreline with *Ammophila arenaria* (2120)
- Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)

The first habitat represents vegetated shingle, the next two are saltmarsh habitats, the fourth and fifth are associated with sand dune systems. All five of these habitats are found in close association with each other. The distribution of known shingle sites is presented in Appendix I, saltmarsh habitats in Appendix II and sand dune habitats in Appendix III.

Other Annex I habitats which are present but are not qualifying interests for the site include, 'annual vegetation of driftlines', 'embryonic shifting dunes' and 'humid dune slacks', and 'Salicornia flats' which were recorded by the Coastal Monitoring Project (CMP) (Ryle *et al*., 2009) and the Saltmarsh Monitoring Project (SMP) (McCorry & Ryle, 2009).

The Annex II mollusc *Vertigo angustior* has also been recorded from the site.

This backing document sets out the conservation objectives for the five coastal habitats listed above in Streedagh Point Dunes SAC, which is defined by a list of parameters, attributes and

targets. The main parameters are (a) Range (b) Area and (c) Structure and Functions, the last of which is broken down into a number of attributes, including physical structure, vegetation structure and vegetation composition.

The targets set for the **shingle** is based in part on the findings of the National Shingle Beach Survey (NSBS), which was carried out in 1999 on behalf of the National Parks and Wildlife Service (NPWS) (Moore & Wilson, 1999). The distribution of known shingle sites in Streedagh Point Dunes SAC is presented in Appendix I.

The NSBS visited the following sub-site within Streedagh Point SAC:

1. Streedagh

Profiles and transects were recorded from each shingle beach and each site was assigned a crude High/Medium/Low interest ranking. A 'high interest' ranking denotes a site that is of high conservation value. The site may be of interest botanically or geomorphologically. A 'medium interest' ranking implies the site may be extensive but not of particular interest either botanically or geomorphologically. A 'low interest' ranking is reserved for small sites, highly damaged sites or sites that are of a very common classification. Streedagh is rated a site of 'high interest' as it has a well-developed and diverse vegetation cover, including a superb cover of lichens,

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

The targets set for the **saltmarsh habitats** are based primarily on the results of the Saltmarsh Monitoring Project (SMP) (McCorry & Ryle, 2009) and this document should be read in conjunction with that report.

The SMP surveyed, mapped and assessed a total of one sub-site within Streedagh Point Dunes SAC (McCorry & Ryle, 2009):

1. Streedagh Point

The distribution of saltmarsh habitats within Stredagh Point Dunes SAC is presented in Appendix I.

At Streedagh Point, saltmarsh has developed in patches along the back of the sand spit, adjacent to extensive intertidal sand flats. Saltmarsh habitat is also found around the southern shoreline adjacent to Streedagh townland and continues along a narrower channel to Rinroe. The Grange River enters the intertidal area at Rinroe and there is some more substantial

saltmarsh development in the low-lying area along the north side of the river channel. The mainland side of the site has a generally quite narrow band of saltmarsh vegetation along the shore (McCorry & Ryle, 2009).

The saltmarsh found at Streedagh Point is quite widely distributed around the SAC. Atlantic salt meadow is the main saltmarsh habitat found at this site and was the only habitat found along the back of the spit. This saltmarsh is a typical 'sandflats' type saltmarsh and there are natural unmodified transitions at the upper boundary to fixed dune vegetation (McCorry & Ryle, 2009).

As part of the SMP, a detailed individual report and habitat map was produced for each sub-site and the relevant one for Streedagh Point are included in Appendix III. The conservation objectives for the saltmarsh habitats in Streedagh Point Dunes SAC are based primarily on the findings of the SMP for the sub-site. There are additional areas of saltmarsh known to be present within the SAC, however, it is estimated that the one sub-site as surveyed by the SMP represents approximately 95% of the total area of saltmarsh within Streedagh Point Dunes SAC.

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

As part of the Coastal Monitoring Project (CMP), a detailed individual report and habitat map was produced for one sub-site (Streedagh) and this is included in a set of Appendices to this document (Appendix IV).

The conservation objectives for the sand dune habitats in Streedagh Point Dunes are based on the findings of the individual report for this site, combined with the results of Gaynor (2008). It is thought that the Streedagh site as surveyed by the CMP represents the total area of sand dunes within Streedagh Point Dunes SAC.

2 Conservation Objectives

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

3 Perennial vegetation of stony banks

Perennial vegetation of stony banks is vegetation that is found at or above the mean high water spring tide mark on shingle beaches (i.e., beaches composed of cobbles and pebbles). It is dominated by perennial species (i.e. plants that continue to grow from year to year). The first species to colonise are annuals or short-lived perennials that are tolerant of periodic displacement or overtopping by high tides and storms. Level, or gently-sloping, high-level mobile beaches, with limited human disturbance, supports the best examples of this vegetation. More permanent ridges are formed by storm waves. Several of these storm beaches may be piled against each other to form extensive structures.

At Streedagh Point Dunes the main dune system overlies a shingle spit. A boulder/shingle beach fronts the entire dune system. The shingle consists of sandstone, mudstone and limestone boulders and cobbles that contain fine specimens of fossils. The shingle at this site is highly rated owing to the shingle-based dune system. The shingle substrate is stony and exposed with an angular gravel shape. Associated habitats include shingle-based grassland, sand dunes and saltmarsh. Lichens are also present (Moore & Wilson, 1999).

3.1 Overall Objective

The overall objective for 'perennial vegetation of stony banks' in Streedagh Point Dunes SAC is to 'maintain the favourable conservation condition'. This objective is based on an assessment of the current condition of the habitat under a range of attributes and targets. The assessment is divided into three main headings (a) Range, (b) Area and (c) Structure and Functions.

3.2 Area

3.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target for favourable condition is *'no decrease in extent from the established baseline'*. Bearing in mind that coastal systems are naturally dynamic and subject to change even within a season, this target is assessed subject to natural processes, including erosion and succession.

The exact current extent of this habitat in Streedagh Point Dunes SAC is unknown. The National Shingle Beach Survey recorded the presence of vegetated shingle but did not map the extent from one sub-site: Streedagh (Moore & Wilson, 1999).

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

3.3 Range

3.3.1 Habitat distribution

A boulder/shingle beach fronts the entire dune system at Streedagh.

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

3.4 Structure and Functions

A fundamental aim of shingle conservation is to facilitate natural mobility. Shingle beaches are naturally dynamic systems, making them of geomorphological interest as well as ecological interest. They are constantly changing and shingle features are rarely stable in the long term.

The shingle beaches within the Streedagh Point Dunes SAC appear to be functioning naturally, with no artificial restrictions to beach dynamics (Moore & Wilson, 1999).

3.4.1 Functionality and sediment supply

The health and on-going development of this habitat relies on a continuing supply of shingle sediment. This may occur sporadically as a response to storm events rather than continuously. Interference with the natural coastal processes, through offshore extraction or coastal defence structures in particular, can interrupt the supply of sediment and lead to beach starvation.

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

3.4.2 Vegetation structure: zonation

Ecological variation in this habitat type depends on stability; the amount of fine material accumulating between the pebbles; climatic conditions; width of the foreshore and past management of the site. The ridges and lows also influence the vegetation patterns, resulting in characteristic zonations of vegetated and bare shingle. In the frontal less stable areas of shingle, the vegetation tends to be dominated by annuals and short-lived salt-tolerant perennials. Where the shingle is more stable, the vegetation becomes more perennial in nature and may include grassland, heathland and scrub, depending on the exact nature of the site. The presence of lichens indicates long term stability of the shingle structure. Transitions to intertidal, saltmarsh and sand dune habitats occur at this site.

The Streedagh sub-site is associated with shingle based grassland, sand dunes and saltmarsh. Lichens were also recorded at this site by the NSBS indicating a degree of stability (Moore & Wilson, 1999).

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

3.4.3 Vegetation composition: typical species & sub-communities

The degree of exposure, as well as the coarseness and stability of the substrate determines species diversity. The shingle at Streedagh Point Dunes is known to support a typical flora for this habitat.

The vegetation on the front of the shingle deposit at Streedagh is scattered and concentrated at points where the dunes are low or non-existent. Species recorded by the NSBS include the following: cat's ear (*Hypochoeris radicata*), marram (*Ammophila arenaria*), kidney vetch (*Anthyllis vulneraria*), smooth hawksbeard (*Crepis capillaris*), wild carrot (*Daucus carota*), Portland spurge (*Euphorbia portlandica*), lady's bedstraw (*Galium verum*), sea milkwort (*Glaux maritima*), birdsfoot trefoil (*Lotus corniculatus*), silverweed (*Potentilla anserina*), sea campion (*Silene uniflora*) and perennial sow thistle (*Sonchus arvensis*).

The dunes at Streedagh support cobble based flats between the dunes similar to Ballyteige Burrow, County Wexford. Species recorded here include the following: marram (*Ammophila arenaria*), kidney vetch (*Anthyllis vulneraria*), wild carrot (*Daucus carota*), Portland spurge (*Euphorbia portlandica*), lady's bedstraw (*Galium verum*), mouse-ear hawkweed (*Hieracium pilosella*), bird'sfoot trefoil (*Lotus corniculatus*), buck'shorn plantain (*Plantago coronopus*) and white clover (*Trifolium repens*) (Moore & Wilson, 1999).

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

3.4.4 Vegetation composition: negative indicator species

Where the shingle becomes more stabilised, negative indicator species can become an issue. Negative indicator species can include non-native species (e.g. *Centranthus ruber, Lupinus arboreus*); species indicative of changes in nutrient status (e.g. *Urtica dioica*) and species not considered to be typical of the habitat (e.g. *Pteridium aquilinum*).

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

4 Saltmarsh habitats

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

- *Salicornia* and other annuals colonising mud and sand (1310)
- **Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330)**
- **Mediterranean salt meadows (*Juncetalia maritimi*) (1410)**
- Mediterranean and thermo-Atlantic Halophilous scrubs (Sarcocornetea fruticosi)

The second two habitats (in bold) are listed as a Qualifying Interests for Streedagh Point Dunes SAC. The last habitat is restricted in its distribution to sites in the southeast of the country. *Salicornia* flats was also recorded at this SAC by the SMP (McCorry & Ryle, 2009).

The distribution of saltmarsh habitats within Streedagh Point Dunes SAC is presented in Appendix I. The SMP surveyed, mapped and assessed the following saltmarsh sub-site within the SAC (McCorry & Ryle, 2009):

1. Streedagh Point (Appendix III)

4.1 Overall Objectives

The overall objective for 'Atlantic salt meadows' in Streedagh Point Dunes SAC is to '*restore the favourable conservation condition*'.

The overall objective for 'Mediterranean salt meadows' in Streedagh Point Dunes SAC is to '*restore the favourable conservation condition*'.

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

4.2 Area

4.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target is no decrease in extent from the baseline which was established by McCorry and Ryle (2009). Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is assessed subject to natural processes, including erosion and succession.

A baseline habitat map of all saltmarsh in the Streedagh Point Dunes SAC was produced based on the findings of the SMP (McCorry & Ryle, 2009) and is presented in Appendix II. A total of 19.53ha of saltmarsh habitat was mapped by the SMP within the SAC at the four sub-sites and an additional 0.21ha of potential saltmarsh habitat was identified using aerial photographs, to give a total estimated area of 19.74ha for the SAC.

The total areas of each saltmarsh habitat within the SAC and the total area of the habitat within each sub-site as mapped by the SMP 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 at Streedagh Point Dunes 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 site's conservation objectives:

1. Where a polygon was identified as a mosaic of an Annex I habitat and a non-Annex I habitat, then the entire area was counted as the Annex I habitat.

2. Where a polygon was identified as a mosaic of two Annex I habitats, the area was divided 50:50 for each habitat.

Sub-site	Total area (ha) of ASM (excluding mosaics) from SMP	Total area (ha) of ASM within SAC boundary (including mosaics)
Streedagh Point	13.138	12.82
Potential ASM	0.21	0.22
Total	**13.138**	**13.04**

In view of the fact that the sub-site was rated as 'Favourable' for extent by the SMP (McCorry & Ryle, 2009), the target is that the area of Atlantic salt meadows should be stable or increasing, subject to natural processes, including erosion and succession.

Sub-site	Total area (ha) of MSM (excluding mosaics) from SMP	Total area (ha) of MSM within SAC boundary (including mosaics)
Streedagh Point	7.717	6.70
Total	**7.717**	**6.70**

In view of the fact that this sub-site was rated as 'Favourable' for extent by the SMP (McCorry & Ryle, 2009), the target is that the area of Mediterranean salt meadows should be stable or increasing, subject to natural processes, including erosion and succession.

4.3 Range

4.3.1 Habitat distribution

The saltmarsh found at Streedagh Point Dunes is quite widely distributed around the site (McCorry & Ryle, 2009) as indicated in the distribution map in Appendix I.

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

4.4 Structure and Functions

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

4.4.1 Physical structure: sediment supply

Accretion and erosion are natural elements of saltmarsh systems. Maintaining the sediment supply is vital for the continued development and natural functioning of a saltmarsh system. Interruption to the sediment circulation through physical structures can starve the system and lead to accelerated erosion rates.

The SMP noted that there were no indications of any habitat loss at this site due to land-use changes during the current monitoring period. Also noted were indicators of accretion with an accretion ramp present along the lower boundary of a significant portion of the ASM (McCorry & Ryle, 2009).

The MSM at the site is not affected to the same extent as the ASM by accretion at the site, however, no indications of any habitat loss at this site due to erosion or land use changes were noted during the current monitoring period (McCorry & Ryle, 2009).

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

4.4.2 Physical structure: creeks and pans

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

A large area of ASM found on the spit is unmodified and is in relatively good condition (McCorry & Ryle, 2009).

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

4.4.3 Physical structure: flooding regime

The regular ebb and flow of the tide brings salinity, but also nutrients, organic matter and sediment, which are central to the development, growth and indeed survival of saltmarshes. Saltmarsh vegetation consists of a limited number of halophytic (salt-tolerant) species that are adapted to regular immersion by the tides. Species in the lowest part of the saltmarsh require regular inundation, while those higher up on the marsh can only tolerate occasional inundation.

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

4.4.4 Vegetation structure: zonation

Saltmarshes are naturally dynamic coastal systems. 'Atlantic salt meadows' is the dominant saltmarsh habitat at Streedagh Point Dunes SAC where it occurs in a mosaic with 'Mediterranean salt meadows'. In order to ensure the ecological functioning of all of the saltmarsh habitats it is vital to maintain the zonations and transitions to other habitats, including intertidal, shingle and sand dune habitats. This sub-site supports sandflats-type saltmarshes and there are natural unmodified transitions to fixed dune vegetation at the upper saltmarsh boundary.

The ASM at Streedagh Point is quite diverse and several typical ASM communities were noted by the SMP. The ASM has developed in a range of situations including on sand flats adjacent to the spit and on peaty mud towards the mouth of the Grange River. The ASM is part of a larger coastal ecosystem along the spit and this is a quite dynamic system in places due to accretion and erosion (McCorry & Ryle, 2009).

The MSM at Streedagh Point is quite diverse. Some transitional vegetation has developed along the upper MSM boundary in places. There is also some development of transitions with zonations to stands of sea club-rush (*Bolboschoenus maritimus*) and common reed (*Phragmites communis*).

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

4.4.5 Vegetation structure: vegetation height

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

Much of the saltmarsh at Streedagh Point Dunes SAC is grazed by cattle, particularly at Streedagh and Rinroe. There is also some grazing by sheep at Streedagh. The grazing intensity varies across the site and some areas are left ungrazed. Saltmarsh adjacent to the sandhills at Streedagh is heavily grazed as part of the commonage, and particularly severe damage to the saltmarsh from poaching was noted by the SMP (McCorry & Ryle, 2009).

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

4.4.6 Vegetation structure: vegetation cover

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

At Streedagh Point Dunes there is some poaching in commonage grazed by catlle at the saltmarsh adjacent to the sandhills. Some poaching of the saltmarsh by horse riders was also noted around the site by the SMP (McCorry & Ryle, 2009).

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

4.4.7 Vegetation composition: typical species & sub-communities

Saltmarshes contain several distinct zones that are related to elevation and frequency of flooding. The lowest part along the tidal zone is generally dominated by the most halophytic (salt-tolerant) species including common saltmarsh-grass (*Puccinellia maritima*) and species more usually associated with *Salicornia* muds. The mid-marsh zone is generally characterised by sea thrift (*Armeria maritima*), sea plantain (*Plantago maritima*) and sea aster (*Aster*

tripolium). This mid-zone vegetation generally grades into an herbaceous community in the upper marsh, dominated by red fescue (*Festuca rubra*), sea milkwort (*Glaux maritima*) and saltmarsh rush (*Juncus gerardii*).

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

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

Species of local distinctiveness such as saltmarsh flat-sedge (*Blysmus rufus*) were recorded in the MSM and forms a distinctive community in the upper marsh in places.

Turf fucoids (dwarf eco-types of the brown algae *Fucus* spp. and *Ascophyllum* spp.), which are characteristic of western Irish Atlantic saltmarshes, were recorded also recorded at this sub-site (McCorry & Ryle, 2009).

4.4.8 Vegetation structure: negative indicator species

There are no negative indicator species recorded on the saltmarshes within Streedagh Point Dunes SAC (McCorry & Ryle, 2009) though common cordgrass (*Spartina anglica*) has been recorded in the north west of the country (Preston *et al*., 2002).

The aim is that negative indicators should be absent or under control. As this would represent a new site for *Spartina*, the current target is that this species should remain absent.

5 Sand dune habitats

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

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

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

Five dune habitats were recorded by Ryle *et al*. (2009) from Streedagh Point Dunes but only the two habitats 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. An area of 0.02ha of annual vegetation of driftlines, 0.42ha of embryonic dunes and 0.68ha of humid dune slacks were also recorded during the CMP (Ryle *et al*., 2009).

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).

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

All 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 Streedagh are presented in Appendix IV. A total of 85.67ha of sand dune habitat was mapped within the Streedagh Point Dunes SAC, of which 84.55ha represents habitats that are listed as qualifying interests for this particular site.

5.1 Overall objectives

The overall objective for 'Shifting dunes along the shoreline with *Ammophila arenaria* (white dune)' in Streedagh Point Dunes SAC is to 'restore the favourable conservation condition'.

The overall objective for 'Fixed coastal dunes with herbaceous vegetation' in Streedagh Point Dunes 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.

5.2 Area

5.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. A baseline habitat map was produced for the sand dune habitats in Streedagh Point Dunes SAC 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 sand dune habitat within the SAC as estimated by Ryle *et al*. (2009) are presented in the second column of the following table. These figures were subsequently checked and adjusted to take into account some overlapping polygons and mapping errors. The adjusted figures are presented in the final column.

Habitat	**Total area (ha) of habitat from CMP**	**Total area (ha) of habitat within SAC boundary**
Shifting dunes along the shoreline with *Ammophila arenaria*	2.12	2.12
Fixed coastal dunes with herbaceous vegetation	82.99	82.44
Total	**85.11**	**84.56**

In view of the reported losses in extent recorded by the CMP, the general target for this attribute in the case of each habitat is that the area should be 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.

5.3 Range

5.3.1 Habitat distribution

The distribution of sand dune habitats at Streedagh Point Dunes as mapped by Ryle *et al.* (2009) is presented in Appendix II.

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

5.4 Structure and Functions

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

5.4.1 Physical structure: functionality and sediment supply

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

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

Streedagh Point Dunes are eroding on the seaward side (i.e. along the strand), but there is accretion behind the tombolo. Recreation (particularly pedestrian traffic), coupled with natural erosion has led to loss of sand from the system. There is however, local reworking of sediment with accretion to the rear of the dunes (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.

5.4.2 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.

Streedagh Point Dunes support a range of dune habitats that are part of a larger coastal ecosystem. In addition to the qualifying interest habitats (shifting dunes with *Ammophila arenaria* and fixed dunes), annual vegetation of driftlines, embryonic shifting dunes and humid dune slacks were also recorded by the CMP (Ryle *et al*., 2009). The dune habitat grades into an extensive saltmarsh system (Ryle *et al*., 2009).

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

5.4.3 Vegetation structure: bare ground

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

Recreational pressure is impacting on the fixed dunes at Streedagh Point Dunes, however it is unclear how much of the bare sand visible can be attributable to anthropogenic factors and how much is due to natural erosion.

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

5.4.4 Vegetation composition: plant health of dune grasses

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

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

5.4.5 Vegetation structure: vegetation height

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

Cattle, sheep and rabbits graze the Streedagh Point Dunes, particularly the southern end of Conor's Island, and have helped to maintain a species-rich, low-growing, grassy sward.

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

5.4.6 Vegetation composition: typical species & sub-communities

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

polytrichus), kidney vetch (*Anthyllis vulneraria*), wild pansy (*Viola tricolor*) and biting stonecrop (*Sedum acre*).

The fixed dunes at Streedagh Point are particularly species-rich and support a range of typical fixed dune species. Locally abundant species include bee orchid (*Ophrys apifera*), pyramidal orchid (*Anacamptis pyramidalis*) and variegated horsetail (*Equisetum variegatum*). The moss and lichen communities characteristic of fixed dunes are well represented at this site.

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

5.4.7 Vegetation composition: negative indicator species

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

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

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

5.4.8 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.

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.

6 References

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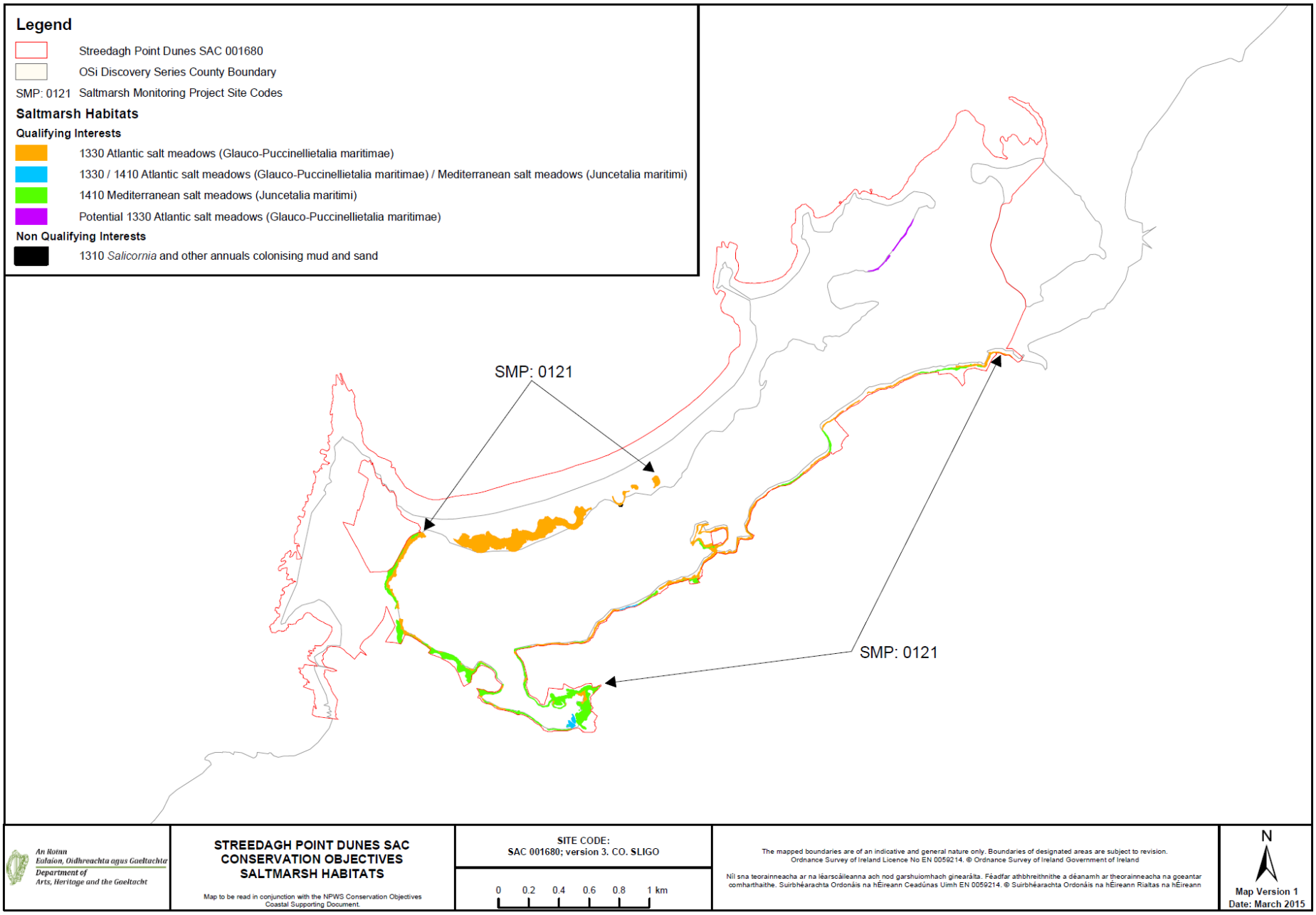
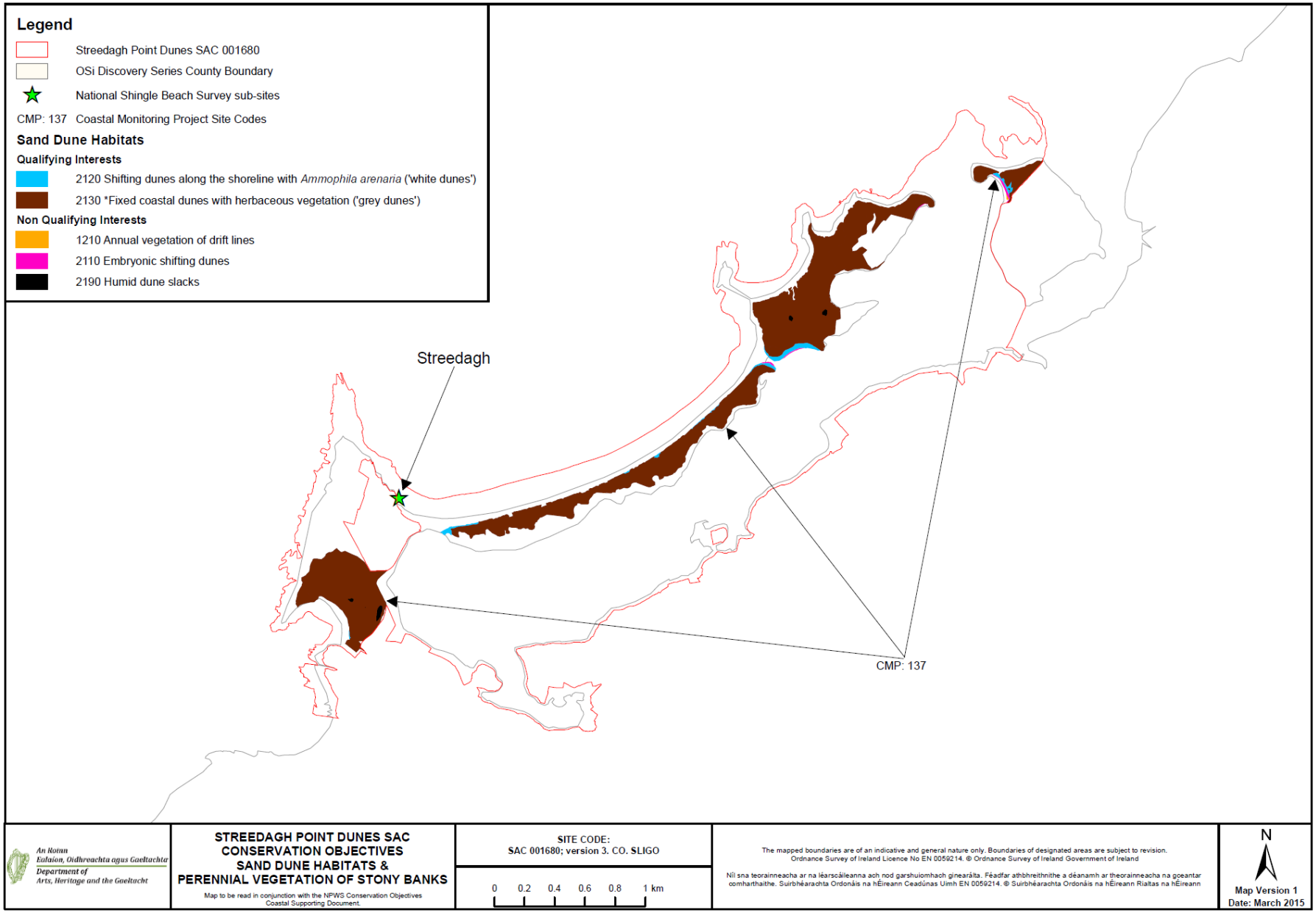
Preston, C.D., Pearman, D.A. and Dines, T.D. (2002). *New Atlas of the British and Irish Flora.* Oxford University Press, Oxford.

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

Appendix I –Distribution map of saltmarsh habitats within Streedagh Point Dunes SAC



Appendix II – Distribution map of sand dune habitats within Streedagh Point Dunes SAC



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

SITE DETAILS

SMP site name: **Streedagh Point**		SMP site code: **SMP0121**
Dates of site visit **17-18/07/2008**		CMP site code: **137**
SM inventory site name: **Streedagh Point**		SM inventory site code: **33**
NPWS Site Name: **Streedagh Point Dunes**		
NPWS designation	cSAC: **1680**	MPSU Plan: **new format plan available 2006**
	pNHA: **1680**	SPA: **N/A**
County: **Sligo**		Discovery Map: **16** Grid Ref: **164465, 350370**
Aerial photos (2000 series **O 0735-A,C,D; O 0769-B,D; O 0770-A,B,C**		6 inch Map No: **Sl 002, 005**

Annex I habitats currently listed as qualifying interests for Streedagh Point Dunes cSAC.

H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)

H1410 Mediterranean salt meadows (Juncetalia maritimi)

Other SMP sites within this SAC/NHA: **N/A**

Saltmarsh type: **Sandflats** Substrate type: **Sand**

SITE DESCRIPTION

Streedagh Point is located in north Co. Sligo near the village of Grange and 14 km north of Sligo Town. Streedagh Point is a tombolo, a long shingle spit overlain with sand dunes running parallel to the coast that has partially enclosed a large area of intertidal flats. The spit connects higher rocky outcrops at Conor's Island to Streedagh Point. The sand dune complex at this site was surveyed by the Coastal Monitoring Project in 2006. The area behind the sand dune system is the estuary of Grange River, which flows into the site at the south-east corner. The tidal channel flows northwards and enters the sea eventually at Dernish Island. The sand dune system is an important amenity area and a long beach on the seaward side of the spit attracts surfers and bathers. A car park near the southern end of the beach has been provided by Sligo County Council. The beach is also a blue flag beach.

The adjacent mainland is dominated by farmland and there are gentle-moderate slopes to the shoreline from higher ground. The mainland mainly supports improved grassland and wet grassland. The shoreline can be accessed by several lanes and tracks along this area. There is scattered habitation around the site on the mainland shore and along Streedagh Point. Sand Hills develop on Streedagh Point and are also found along the long spit.

The survey site was taken as the shoreline of the entire inner estuary and north to Mount Temple. Saltmarsh has developed in patches along the back of the sand spit. This saltmarsh has developed adjacent to extensive intertidal sand flats. Saltmarsh habitat is also found around the southern shoreline adjacent to Streedagh Townland and continues along a narrower channel to Rinroe. The Grange River enters the intertidal area at Rinroe and there is some more substantial saltmarsh development in a sheltered low-lying area along the north side of the river channel. Mudflats are found in this narrower channel. The mainland side of the site has a generally quite narrow band of saltmarsh vegetation along the shore.

This site is part of Streedagh Point Dunes candidate Special Area of Conservation (cSAC 1680). This smaller coastal cSAC contains the sand dune complex along the spit and the extensive sandflats within the estuary. The sand dune complex was mapped by the CMP project in 2006 (Ryle *et al.* 2009). The sand flats attract moderate numbers of wintering waders and wildfowl in winter. Three Annex I saltmarsh habitats were recorded at this site, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). Only the latter two habitats are listed as qualifying interests for this cSAC.

One species of local distinctiveness, Saltmarsh Flat-rush (*Blysmus rufus*), was found at this site and forms a distinctive community in the upper marsh in places. Turf fucoids were also noted at this site.

The majority of the saltmarsh habitat is found within the digital cSAC boundary. Some small patches of saltmarsh habitat are excluded from the cSAC. These are found in low-lying fields that were excluded from the cSAC in Streedagh and Rinroe. The upper shoreline boundary as mapped by the old OSI 2nd edition 6 inch map is taken as the boundary of the cSAC along much of the estuary. Small rectification differences between the OSI 6 inch map and the OSI aerial photos means that some minor saltmarsh habitat extends beyond this boundary in places along the mainland shore

The western part of the site was accessed from the car park at Streedagh Point. The mainland shore was accessed at several of the lanes and tracks that extend down to the shoreline.

SALTMARSH HABITATS

General description

The saltmarsh found at this site is quite widely distributed around the site. The main habitat found was Atlantic salt meadows (ASM) (Table 3.1). This habitat was the only habitat found along the back of the sand spit. This saltmarsh is a typical 'sandflats' type saltmarsh and there are natural unmodified transitions at the upper boundary to fixed dune vegetation. The topography of the saltmarsh follows that of the sand-dunes and the saltmarsh habitat extends into low-lying undulations in the sand dune system. This saltmarsh has developed on a gentle gradient and zonation is distinctive and well-developed. Bare sand also marks the upper boundary between the saltmarsh and the sand dunes. Further north-west the underlying shingle and cobble banks are more prominent and saltmarsh has developed along the seaward edge of some banks of cobble with sparse vegetation.

Mediterranean salt meadow (MSM) vegetation develops along the southern shoreline adjacent to Streedagh. It is mainly found on the landward side of the ASM but it also forms a mosaic at times with ASM and extends down to the seaward boundary. The shoreline here slopes are somewhat steeper so saltmarsh development is less extensive. Diverse transitional vegetation is present at the landward boundary where there is some unmodified transition to species-rich wet grassland/ dune slack vegetation on the sand hills. Freshwater seepage from the adjacent moderately sloped land has created a zone of transitional saltmarsh vegetation with freshwater indicators along the landward boundary. There is also some development of brackish vegetation including stands dominated by Sea Club-rush (*Bolboschoenus maritimus*) and Common Reed (*Phragmites australis*) along the landward boundary of the ASM and MSM. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification.

Further east towards the mouth of Grange River the extent and dominance of MSM increases. Brackish stands of Sea Club-rush and Common Reed also increase in extent. Grey Club-rush (*Schoenoplectus lacustris* spp. *tabernaemontani*) also appears along the upper saltmarsh boundary in this area. Both these habitats appear in low-lying areas behind some higher ridges or rocky outcrops closer to the shoreline and the saltmarsh structure and zonation is quite complex. The saltmarsh at Rinroe is dominated by MSM with some brackish stands of Common Reed and Sea Club-rush. Some of this saltmarsh is more typical of "Fringe type" saltmarsh, which has developed on peaty mud. Saltmarsh has developed along the shoreline and along low-lying areas that may extend inland. This area has a complex topography and saltmarsh extends inland between higher mounds and forms mosaics with wet grassland and scrub. There is also some transition to freshwater marsh.

A narrow band of saltmarsh extends along most of the mainland shoreline to Mount Temple. This saltmarsh is fragmented and patchy in places and broken up by sections of cobble beach. It is generally between 5-10 m wide on a moderate-steep shoreline. Some of this saltmarsh has developed on thin substrate and there is frequent scattered cobble and rock over the saltmarsh strip in places. Both ASM and MSM vegetation develops along this shoreline and also forms some mixed sections of mosaic. There is some more extensive ASM saltmarsh developed around the shoreline of Inishnagor, a small rocky outcrop in the estuary along the mainland.

Table 3.1. Area of saltmarsh habitats mapped at Streedagh Point.

EU Code	Habitat	Area (ha)
1310	*Salicornia* and other annuals colonizing mud and sand (1310)	0.001
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	13.138
1410	Mediterranean salt meadows (Juncetalia maritimi)	7.717
	Total	**20.856**

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

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

Only a very small patch of this habitat was mapped at this site. It developed along the seaward edge of the ASM along the sand spit. A small narrow patch of vegetation dominated by Glasswort (*Salicornia* sp.) was present on the sandflats adjacent to the more-established ASM vegetation. Several small patches of this habitat were also noted within some of the salt pans found in the ASM along the spit.

Atlantic salt meadows (H1330)

The ASM at this site is well-developed and is quite diverse, due to being found on several different substrates and in different parts of the shoreline where conditions differ. The ASM along the back of the sand spit is particularly well-developed in places. Several zones are represented and there is significant development of mid-marsh vegetation with typical small-moderate salt pans. Well-developed zonation along a gentle seaward gradient is evident. This saltmarsh has developed on muddy sand. The vegetation is dominated by a typically low sward dominated by Sea Plantain (*Plantago maritima*) and contained less frequent Sea Pink (*Armeria maritima*), Sea Milkwort (*Glaux maritima*) and Red Fescue (*Festuca rubra*). Other species present include Greater Sea-spurrey (*Spergularia media*), Sea Arrowgrass (*Triglochin maritimum*), Common Scurvy-grass (*Cochlearia officinalis*) and Sea Aster (*Aster tripolium*). Common Saltmarsh-grass (*Puccinellia martima*) and Lax-flowered Sea Lavender (*Limonium humile*) appear around some depressions and the edges of creeks and pans

within this zone. The lower and pioneer zones are particularly well-represented along the edge of the saltmarsh near the car-park. Low-lying mounds that have developed on very sandy substrate are dominated by Common Saltmarsh-grass and also contain frequent Sea Milkwort and occasional Sea Aster, Lax-flowered Sea Lavender, Glasswort and Annual Sea-blite (*Suaeda maritima*). A large area of lower saltmarsh contains frequent bare sand cover and this is indicative of a dynamic system and the fact that the saltmarsh has expanded recently in this area. This area has not vegetated completely yet and there are some larger mounds present with embryonic dune vegetation present dominated by Sand Couch (*Elytigia juncea*) along with some Sea Sandwort (*Honckenya peploides*).

Further north-east along the spit the extent of pioneer and lower marsh vegetation is reduced and the seaward edge of the saltmarsh is largely dominated by mid marsh. There is some secondary growth of low marsh vegetation along a low saltmarsh cliff in places. Turf fucoids were noted in the lower zone vegetation in places. Some areas contain scattered cobbles from the storm beach along the seaward side of the site. The mid upper zone is characterised by a taller sward with more frequent Red Fescue and large areas dominated by Saltmarsh Rush (*Juncus gerardii*). This zone also contains small amounts of Creeping Bent (*Agrostis stolonifera*), Sea Arrowgrass, Sea Plantain and some Long-bracted Sedge (*Carex extensa*). The upper boundary is characterised by the appearance of species such as Sea Sandwort and Knotted Pearlwort (*Sagina nodosa*) and there is some development of pioneer or disturbed vegetation due to sand accretion. Some of the vegetation along the upper boundary is dominated by Greater Sea-spurrey.

The ASM found along the inner side of Streedagh Point contains similar vegetation communities. Much of this ASM is characterised by very heavy grazing levels and the surface of the saltmarsh is quite poached and tussocky. The upper ASM contains more frequent Creeping Bent and White Clover (*Trifolium repens*) in places and also contains some Autumn Hawkbit (*Leontodon autumnalis*).

Much of the ASM found on the mainland shoreline is found on relatively thin substrate and forms a mosaic with exposed cobble in places. There are transitions along the lower boundary to a band of cobble and shingle on the lower shore before the extensive development of intertidal sandflats. There is some zonation along this shoreline on a moderate-steep slope. The mid-upper zone is characterised by frequent Saltmarsh Rush and some further zonation to Red Fescue where the saltmarsh is somewhat more extensive. There are occasional patches with frequent Saltmarsh Flat-rush in this zone. Other species recorded include Common Sea Century (*Centaurium erythraea*) (rare). The low-mid zone is dominated by Sea Plantain and there is also some development of patches of Common Saltmarsh-grass, Lax-flowered Sea Lavender and Greater Sea-spurrey. The ASM transitions to field boundaries along the upper shoreline and there is also some transition to Twitch (*Elytrigia repens*)-dominated vegetation on this shoreline.

Mediterranean salt meadows (H1410)

The MSM are also relatively diverse at this site. This vegetation is characterised by the presence of frequent Sea Rush (*Juncus maritimus*), which may dominate the vegetation. The narrow band of vegetation along the north-east side of Streedagh Point has developed on a moderate-steep slope. There is some zonation evident within the MSM. The upper zone is quite grassy and contains frequent Red Fescue and smaller amounts of Creeping Bent and Saltmarsh Rush. Other species present in small amounts include Sea Pink, Sea Aster, Sea Milkwort, Sea Arrowgrass and Common Scurvy-grass. Species rarely found include Autumn Hawkbit and Parsley-leaved Water-dropwort (*Oenanthe lachenalii*). One section also contained some Spike-rush (*Eleocharis uniglumis*). The lower zone contains frequent Sea

Plantain in a low sward amongst the tussocks of Sea Rush. This zone also contains Sea Pink, Sea Aster and Lax-flowered Sea Lavender.

Further south along Streedagh Point (mid section), the MSM has developed along side some diverse wet grassland with elements of dune slack on a relatively steep slope. The transitional zone along the upper boundary of the MSM contains a mixed sward with Sea Rush, Long-bracted Sedge, Parsley Water-dropwort, Saltmarsh Flat-rush and Sea Club-rush, and also contains Yellow Flag (*Iris pseudacorus*), Ragged Robin (*Lychnis flos-cuculi*), Red Clover (*Trifolium pratense*), Wild Celery (*Apium graveolens*), Brookweed (*Samolus valerandi*), Marsh Arrowgrass (*Triglochin palustris*), Marsh Pennywort (*Hydrocotyle vulgaris*), False Fox Sedge (*Carex otrubae*), Glaucous Sedge (*Carex flacca*), Mint (*Mentha aquatica*), Silverweed (*Potentilla anserina*), White Clover (*Trifolium repens*), Seal Heal (*Prunella vulgaris*) and Creeping Buttercup (*Ranunculus repens*). Jointed Rush (*Juncus articulatus*) becomes dominant at the upper side of this transitional zone. This area is badly poached by cattle.

Further south the MSM forms mosaics in places with Sea Club-rush. Some of this vegetation is not grazed and the lack of grazing seems to encourage the spread of Sea Club-rush at the expense of Sea Rush-dominated vegetation. Some wet grassland with Purple Moor-grass and Black-bog Rush has developed along the upper saltmarsh boundary in places where there is greater peat influence. Both these species can also appear with Sea Rush in the upper MSM. Common Sea-century was also found in the upper saltmarsh but was rare.

MSM found at Rinroe is characterised by dense cover of Sea Rush in places. The MSM forms a complicated mosaic with low-lying grassland and mounds with scrub in places. Species such as Purple Moor-grass (*Molinia caerulea*), Black Bog-rush (*Schoenus nigricans*), Bog Pimpernel (*Anagallis arvensis*) and Glaucous Sedge are found in the upper saltmarsh zone. Some transitional brackish vegetation occurs along the lower shoreline where there are stands Sea Club-rush in places.

MSM is also found on the mainland shoreline where Sea Rush predominates. The MSM also forms mosaics with ASM in places where Sea Rush is sparely distributed along the shoreline. Other typical species include Red Fescue, Sea Plantain and Saltmarsh Rush. Other species present in low amounts includes Lax-flowered Sea Lavender, Sea Pink, and Sea Aster. Saltmarsh-flat rush is frequently found in low amounts along the shoreline within the MSM.

IMPACTS AND ACTIVITIES

This site is affected by several impacts and activities (Table 4.1). This saltmarsh is divided into many different management units as it is so widely distributed around the estuary. Much of the saltmarsh is grazed by cattle, particularly around Streedagh and at Rinroe (140). There is also some grazing by sheep at Streedagh. The grazing intensity varies across the site. Saltmarsh along the sand spit was ungrazed or only very lightly grazed. This area is managed as commonage. Some sections of saltmarsh on the shoreline along Streedagh are fenced off and are left ungrazed. Some fields are not grazed at all and have been abandoned so this saltmarsh is not grazed. Saltmarsh adjacent to the sand hills at Streedagh is heavily grazed as part of the commonage and there is some particularly severe damage to the saltmarsh from poaching (143). The shoreline is generally fenced off to prevent livestock wandering through the estuary. The saltmarsh along the mainland shoreline is not grazed as there is shoreline access to cattle and sheep in adjacent fields.

There are several riding schools in the area and the sand flats are used to exercise horses and for pony-trekking. Some poaching of the saltmarsh by horse riders was also noted

around the site (622). The saltmarsh along the spit is also used by walkers, but there is little obvious damage.

The NPWS management plan for the site noted that the back of the beach is heavily used by campers and caravans during the summer (608). No facilities are present and these activities are unlicensed. These activities were causing some damage to the saltmarsh, as well as ATV use (623). No campers were noted during the site visit.

Several tracks (501) were noted on the saltmarsh around the site. These include on the sand spit and in sections along the mainland shoreline. Tracks extend along the mainland shore in allow access to other fields along the shore in places. Wheel ruts were also noted on the saltmarsh along the spit were there is access to vehicles (623). There are also frequent access tracks across the shoreline and saltmarsh from adjacent lanes and tracks to allow access to the shoreline. Some of these are used by horse-riders (622). Long-term use by vehicles and horse-riders has worn away the saltmarsh vegetation in places.

There has been some drainage (810) or cleaning of drains along the Streedagh shoreline during the current assessment period.

There are some signs of accretion (910) of saltmarsh along the sand spit, particularly near the car park. An accretion ramp and isolated mounds are present along the seaward edge of the saltmarsh and extending onto the sand flats. There is some pioneer saltmarsh vegetation on this ramp. A comparison of the habitat map drawn by the CMP in 2006 and this SMP habitat map shows that the saltmarsh has measurably grown at this location during this period (0.3 ha). This is also shown by a comparison of the extent of saltmarsh in the OSI 2000 and 2005 series aerial photos.

The saltmarsh shoreline along the spit is likely to be quite dynamic and significant differences can be seen between the profile of the shore as mapped by the OSI 2nd edition 6 inch map and the current profile. Signs of recent erosion (900) were also noted further north-east along the spit where a low saltmarsh cliff has developed in places along the lower saltmarsh boundary, particularly along the edge of the semi-circular bands that extend further out onto the sandflats. Accretion can be seen in the sheltered ‘inlets’ between there more exposed eroding ‘heads’. Erosion is assessed as having a neutral impact on a small portion of the saltmarsh and any erosion is being balanced by accretion.

There has been some measurable growth of saltmarsh in places, particularly along the inner side of Streedagh Point, where the saltmarsh has expanded by 20-30 m when the current extent of saltmarsh is compared to the OSI 2nd edition 6 inch map.

Impacts and activities around the site are mainly related to farming (102, 120, 140) and amenity use of the spit (608, 622). There is also scattered habitation around the site (403) and some lanes and tracks (501). Aquaculture is carried out at the head of the bay. These activities have no measurable impact on the saltmarsh at this site other than those already mentioned.

Table 4.1. Intensity of various activities on saltmarsh habitats at Streedagh Point

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1330	140	B	0	2.0	Inside
1330	143	A	-1	0.4	Inside
1330	501	C	-2	0.01	Inside
1330	622	C	-1	1.0	Inside
1330	623	C	-1	1.0	Inside
1330	900	C	0	0.5	Inside
1330	910	C	+1	1.0	Inside
1410	140	C	0	4.5	Inside
1410	143	A	-1	0.4	Inside
1410	501	C	-2	0.01	Inside
1410	622	C	-1	0.5	Inside
1410	900	C	0	0.5	Inside

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

CONSERVATION STATUS

Overall Conservation Status

The conservation status of a site is assessed on the condition of the site and on baseline information. The main source of baseline information for this site is the NHA survey, the 1995, 2000 and 2005 OSI aerial photo series. The baseline information from the NHA survey is generally limited to some descriptions of saltmarsh habitat and does not record the specific condition of the saltmarsh during the survey at this site.

Streedagh Point saltmarsh is a moderately-sized site with several features of notable conservation interest. The saltmarsh vegetation is widely distributed over the site. The development of the saltmarsh has varied with some of the saltmarsh developing on sand and some of the saltmarsh more typical of 'fringe type' saltmarsh and has developed on peaty mud. A large area of ASM saltmarsh found on the spit is unmodified and is in relatively good condition. There is a substantial area of pioneer saltmarsh associated with this ASM. Some diverse transitional vegetation has developed along the upper saltmarsh boundary in places. Species of local distinctiveness such as Saltmarsh Flat-rush and Turf fucoids were recorded at the site.

The overall conservation status of this site is assessed as *unfavourable-inadequate* (Table 5.1). Heavy grazing levels are badly damaging one section of the site. Some of the other saltmarsh is being damaged by a range of amenity uses including horse-riding and vehicle use. However, most of the saltmarsh is in good condition.

The majority of the saltmarsh habitats found at this site is located within Streedagh Point Dunes cSAC. A NPWS management plan is available for this cSAC.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Streedagh Point.

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

Extent

The extent of this habitat is assessed as *favourable*. Only a very small patch of habitat is present. There is no information available on the previous extent of this habitat at this site. There are no indications of any habitat loss at this site due to erosion or any other factors.

Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. No monitoring stops were carried out in this habitat due to its relatively small extent. However, a visual assessment indicates that it is in good condition. It has developed along an accreting zone adjacent to the established saltmarsh. There are no significantly damaging activities affecting this habitat.

Future prospects

The future prospects of this habitat are assessed as *favourable*. This assessment assumes that the current management activities and level of impacts such as erosion and accretion continue in the near future. This is a quite dynamic saltmarsh with indicators of erosion and accretion both present. These processes mean that small amounts of *Salicornia* flats are likely to persist.

Atlantic salt meadows (H1330)

Extent

The extent of this habitat is assessed as *favourable*. There are no indications of any habitat loss at this site due to erosion or land-use changes during the current monitoring period. There are some indicators of accretion present at this site with an accretion ramp present along the lower boundary of a significant portion of the ASM. The saltmarsh has grown by at least 0.3 ha during the current monitoring period. This is a positive indictor for the extent of ASM at this site.

Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Eighteen monitoring stops were carried out in this habitat and four stops failed. Most the attributes required for favourable conservation status reached their targets. Some of the saltmarsh is badly damaged from heavy grazing levels and poaching. The grazing intensity varies across the site and most of the ASM is in good condition with a variable sward cover. The ASM is quite diverse and several typical ASM communities were present on the site. ASM has developed in a range of situations including on sand flats adjacent to the sand spit and on peaty mud towards the mouth of the Grange River. The ASM is part of a larger coastal ecosystem along the spit and this is a quite dynamic system in places due to accretion and erosion. This ASM is largely intact and unmodified which is a positive indicator. There is a significant area of low marsh and pioneer marsh vegetation present, which is a positive indicator. ASM is also found at other locations around the shoreline and some of this saltmarsh has been modified by the creation of tracks, embankments and drainage channels in the past.

Future prospects

The future prospects of this habitat are assessed as *unfavourable-inadequate*. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. Some of the saltmarsh is currently being badly damaged by heavy grazing levels and this is likely to continue in the near future. Damaging activities to the saltmarsh on the spit from amenity use by horses and vehicles are also likely to continue. Sligo County Council is attempted to reduce the intensity of these impacts by banning camping on the site. This is likely to have a positive impact on the site. Recent accretion near the car-park has increased the area of saltmarsh but this is a dynamic site and the profile of the saltmarsh may change naturally in the future with reductions in the extent of saltmarsh.

Mediterranean salt meadows (H1410)

Extent

The extent of this habitat is assessed as *favourable*. There are no indications of any habitat loss at this site due to erosion or land-use changes during the current monitoring period. This habitat is not affected to the same extent as ASM by accretion at the site.

Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Thirteen monitoring stops were carried out in this habitat and one stop failed. Most the attributes required for favourable conservation status reached their targets. Most of the MSM is in adequate condition. Some of the saltmarsh is badly damaged from heavy grazing levels and poaching. Other MSM is grazed but is not damaged to the same extent as ASM. The MSM is not affected by the amenity activities on the site but is being damaged by the use of the shoreline as a track by horse-riders in places.

The MSM is quite diverse at this site. Some diverse transitional vegetation has developed along the upper MSM boundary in places, which increases the overall diversity and value of the site as a whole. Species of local distinctiveness such as Saltmarsh Flat-rush are present in this habitat type. There is also some development of transitions with and zonation to stands of Sea Club-rush and Common Reed.

Future prospects

The future prospects of this habitat are assessed as *unfavourable-inadequate*. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. Some of the MSM is currently being badly damaged by heavy grazing levels and this is likely to continue in the near future. Pony-trekking along the shoreline and over the MSM is likely to continue, with some negative impacts. There are few other significantly damaging activities affecting this site.

MANAGEMENT RECOMMENDATIONS

There are no specific management recommendations for this site.

REFERENCES

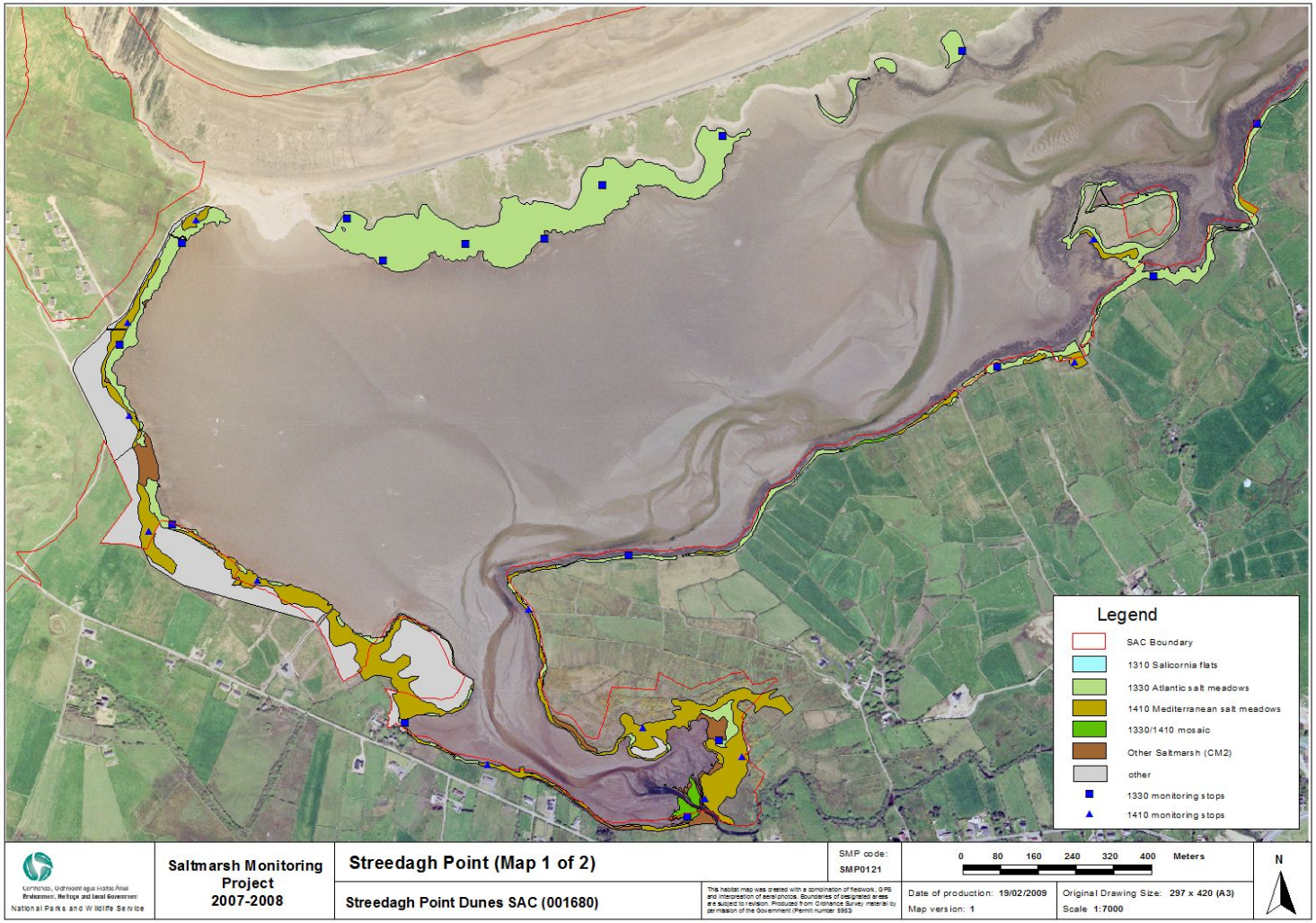
Curtis, T.G.F.C. and Sheehy-Skeffington, M.J. (1998). The salt marshes of Ireland: An inventory and account of their geographical variation. *Biology and Environment: Proceedings of the Royal Irish Academy* **98B**, 87-104.

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

APPENDIX I

Table 8.1. Areas of SMP habitats mapped using GIS.

SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 *Salicornia* flats	0.001	0.001				
2	Spartina swards						
3	1330 Atlantic salt meadow	12.981		12.981			
4	1410 Mediterranean salt meadow	7.56			7.56		
5	ASM/MSM mosaic (50/50)	0.313		0.157	0.157		
6	ASM/*Spartina* mosaic						
7	1330/other SM (CM2) mosaic						
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	7.23					
10	*Spartina* clump/mudflat mosaic (50/50)						
11	Isolated *Spartina* clumps on mud (5%)						
12	pioneer 1330/1310/*Spartina* mosaic						
13	1410/other SM (CM2) mosaic						
14	*Spartina* sward dominated, with some ASM						
15	1310/*Spartina* mosaic						
16	ASM dominated with some Spartina						
17	1330/sand dune mosaic						
18	Other SM (CM2)	1.066					
19	1330/rocky shore mosaic						
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	**29.150**	**0.001**	**13.138**	**7.717**		


Legend
SAC Boundary
1310 Salicornia flats
1330 Atlantic salt meadows
1410 Mediterranean salt meadows
1330/1410 mosaic
Other Saltmarsh (CM2)
other
1330 monitoring stops
1410 monitoring stops
Saltmarsh Monitoring Project 2007-2008
Streedagh Point (Map 1 of 2)
SMP code: SMP0121
0 80 160 240 320 400 Meters
N
Streedagh Point Dunes SAC (001680)
This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated areas are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 5953
Date of production: 19/02/2009
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:7000
National Parks and Wildlife Service


Legend
SAC Boundary
1310 Salicornia flats
1330 Atlantic salt meadows
1410 Mediterranean salt meadows
1330/1410 mosaic
Other Saltmarsh (CM2)
other
1330 monitoring stops
1410 monitoring stops
0 80 160 240 320 400 Meters
N
Saltmarsh Monitoring Project 2007-2008
Streedagh Point (Map 2 of 2)
SMP code: SMP0121
Streedagh Point Dunes SAC (001680)
This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated areas are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 5953)
Date of production: 19/02/2009
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:7000
National Parks and Wildlife Service

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

SITE DETAILS

CMP06 site name: **Streedagh Point** CMP06 site code: **137** CMP Map No.: **134**

County: **Sligo** Discovery map: **16** Grid Reference: **G 645 515**

6 inch Map No.: **SI 2 & 5**

Aerial photographs (2000 series): **O0735-C,D; O0769-B;D O0770-A,B,C**

NPWS Site Name: **Streedagh Point Dunes**

NPWS designation: pNHA: **1680** cSAC: **1680**

Ranger Area**: Sligo**

MPSU Plan**: Draft 2**

Report Author: **Kieran Connolly**

SITE DESCRIPTION

Streedagh Point sand dunes in Sligo are approximately 4km west of the village fo Grange, and 20km north of Sligo town. The site is immediately south of the Bunduff Lough and Machair/Trawalua/Mullaghmre cSAC (625), which incorporates the sand dune systems of Trawalua Strabd and Bunduff that are included in the present report as sites 138 and 139, respectivesly.

The greater part of Streedagh Point sand dunes overlie a narrow shingle spit that joins Streedagh Point in the west of the site with Conor's Island in the east, in a tombolo formation. The sand dunes here extend over approximately 2.5km of north-facing coastline, and are fronted along the entire seaward edge by a boulder/cobble beach The dunes – almost entirely composed of fixed dunes (a priority Annex I habitat) – lie on the landward side of the north-facing strand, which is sometimes referred to as 'Back Strand' on maps. The dunes here are narrow – rarely exceeding 150m in width – and undulating, with numerous hollows alternating with tall dunes that rise up to a maximum of approximately 10m over the beach level.

A large estuary on the landward side of the spit, into which the River Grange flows, comprises extensive intertidal sand flats. Saltmarsh vegetation frrnges the west and northwest sides of the estuary, and borders the southwest corner of the fixed dunes.

Another sizeable area of dunes, also almost entirely comprised of fixed dunes, lies on the landward side of the small west-facing Trawgar strand to the south of Streedagh Point, and to the west of the estuary. The dunes here rise steeply above the strand and adjacent rocky shore.

A further small area of unenclosed dunes was mapped in the northwest corner of Dernish Island, which lies to the east of Conor's Island, and is accessible on foot at low tides. Most of Dernish Island consists of small, agricultural fields that are not underlain by sandy substrate, although there are some small pockets of windblown sand just southwards of the mapped area of fixed dunes. The parts of Conor's Island that are not mapped as sand dune habitats are mostly composed of several small agricultural fields, and a small area of marsh.

The west side of the spit, comprising the dunes at Streedagh Point and the west side of the shingle spit, are a commonage grazing area of 69 hectares, The commonage is divided among 10 shares, two of which are owned by Sligo County Council (MPSU, 2006). The remainder of the site is non-commonage private land, The boundary between the commonage and private areas is shown on the site digital map as a line and 'miscellaneous' information point in the centre of the shingle spit, Cattle, sheep and horses graze the dunes, and much of the grassland is comprised of a species-rich short sward.

The sand dunes and beaches form a significant proportion (an estimated 25% in the relevant NATURA 2000 form) of Streedagh Point dunes cSAC (cSAC 1680). The intertidal mud flats and sand flats in the estuary comprise the greater part (60%) of the total cSAC area, while the remainder includes small areas of Atlantic salt meadows and Mediterranean salt meadows. A housing development and some adjacent intensively farmed land to the northeast of Trawgar strand have been excluded from the cSAC, although the site digital map reveals apparent inaccuracies in the mapping of the exclusion zone boundaries.

Fixed dunes – a priority Annex I habitat – account for almost the entire sand dune area of 86.492ha, with small areas of embryonic dunes, mobile dunes and dune slacks comprising the remaining Annex I sand dune habitats (Table Table 137A). Some shingle strandline vegetation was also mapped along the north coast of Conor's Island.

Table 137A Areas of EU Annex I habitats mapped at Streedagh Point

EU Code	EU Habitat	Area (ha)
H1210	Annual vegetation of driftlines	0.021
H1220	Perennial vegetation of stony banks	0.264
H2110	Embryonic shifting dunes	0.424
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	2.116
H2130	Fixed coastal dunes with herbaceous vegetation	82.989
H2190	Humid dune slacks	0.678
	Total Sand dune	**86.492**

The site is highly scenic and attractive to visitors, and recreational pressures are quite intense. It is within a popular tourist area and is overlooked by Ben Bulbin Mountain, which lies to the southeast. The wide flat beach of fine-grained sand is ppealing to sunbathers, walkers and other users. Streedagh Point is also on the 'De Cuellar Trail' – a tour of sites associated with the Spanish Armada of 1588.

The site is also of considerable geological interest, particularly due to the abundance of coral and brachiopod fossils. A route around Streedagh is featured as one of 10 routes on a 'Walk – Sliog-Leitrim' guide produced by the Geological Survey of Ireland and the Geological Survey of Northern Ireland.

In addition to the range of Annex I habitats and diverse sand dune flora, there are several other elements of particular conservation interest at the site. The Annex II mollusc *Vertigo angustior* occurs in good numbers in the dune hollows behind the back strand (Moorkens, 1997) and maintaining a favourable conservation status for the species within the site is one of the conservation objectives listed in the site management plan (MPSU) plan. A small colony of common seals (*Phoca vitulina*) haul out on the sand banks in the estuary, while Streedagh Estuary supports populations of wintering waterfowl. Several species listed on Annex I of the Birds

Directive, including Red-throated diver, great northern diver, Golden plover and Bar-tailed godwit, have been recorded in the estuary.

The site is readily accessed on public roads, and a car park (consisting only of a stretch of levelled ground) with ample parking space is maintained at the site. Sligo County Council manages the car park and a small adjacent area that encompasses a lifeguard hut.

Fixed Dunes (H2130)

The fixed dunes at Streedagh Point extend along the entire length of the shingle spit, cover much of Conor's Island, a small portion of Dernish Island, and a further large area south of Streedagh Point. Amounting in total to 82.989ha, they account for over 95% of the total sand dune area at the site.

Species diversity was high through much of the fixed dunes, particularly on the shingle spit, with more than 20 species found in a number of monitoring stops. Among the more common species were *Anacamptis pyramidalis* (Pyramidal orchid), *Cerastium fontanum* (Common mousre-ear), *Euphrasia officinalis* agg. (Eyebright), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Pilosella officinarum* (Mouse-ear hawkweed), *Plantago lanceolata* (Ribwort plantain), *Rhinanthus minor* (Yellow rattle), *Trifolium repens* (White clover) and *Veronica chamaedrys* (Germander speedwell). Other less common through regularly noted species included *Anagallis tenella* (Bog pimpernel), *Centaurium erythraea* (Commn centaury), *Leucanthemum vulgare* (Oxeye daisy), and *Viola tricolor* ssp. *curtisii* (Wild pansy). The presence of *Ophrys apifera* (Bee orchid) was also confirmed during the site visit.

Elsewhere, on flushed slopes, *Carex flacca* (Glaucous sedge) and *Succisa pratensis* (Devil's-bit scabious) were frequently recorded together. Also seen occasionally in these situations was *Dactylorhiza* sp. (Orchid sp.).

Negative indicator species do nor, in general, form a significant element of the flora; the occasionally noted *Senecio jacobaea* (Common ragwort) mostly consisted of short, grazed plants, with few attaining flowering and fruiting proportions. Occasional

shrub-sized *Alnus glutinosa* (Alder) land *Acer pseudoplatanus* (Sycamore), and lesser amounts of *Ulex europaeus* (Gorse), were noted in the fixed dunes, although none were a significant component of the dune flora.

Marram, *Ammophila* arenaria, is also common in parts of the fixed dunes, although there is little in the way of rank, ungrazed vegetation. At the eastern tip of the spit adjoining the west side of Conor's Island, the vegetation is semi-fixed in nature, being quite open and containing a high proportion of Marram. The breaching of the spit and consequent greater availability and mobility of sediment here are the likely reasons for the more open structure of the vegetation.

The more common moss species throughout the habitat included *Calliergonella cuspidate, Homalothecium lutescens, Rhytidiadelphus squarrosus, R. triquetris,* and *Tortula ruraliformis*, while *Cladonia* spp. and *Peltigera* spp. lichens were common on hummocks and often found with *Pilosella officinarum* (Mouse-ear hawkweed) and the moss *Homalothecium lutescens.*

The dune grassland is grazed by cattle, sheep horses and rabbits, although stock seemed to be absent from much of the spit on the survey date. However, it appears the the fixed dune sward was not evenly grazed throughout. Towards the east end of the spit, there are areas of longer grass with lower species diversity. Rabbit burrows also appeared to be more common on the western side of the spit. Conor's Island had a mosaic of short-grazed, lightly grazed, and also rank, undergrazed sward.

Foredune development is sparse and died dunes from the seaward boundary of the dunes along almost the entire length of the spit. In many places the dune edge is eroding, and slumping of fixed dune vegetation was common. Erosion and breaching of the seaward edge of the fixed dunes can be clearly seen on the site aerial photographs.

Recreational activities represent a considerable threat to the fixed dunes, particularly in the areas closest to the main access point. There are numerous worn pedestrian tracks throughout the fixed dunes, several of which have compacted soil. Unofficial caravans and camping sites are thought to be a significant problem, as are leisure

activities such as horse riding. Beside the car park, there are several sizeable clumps of *Rubus fruticosus* (Bramble).

There are numerous hollows or level areas in the fixed dunes where erosion has exposed the underlying shingle/cobble substrate. Elsewhere, the shingle is exposed on eroded pedestrian tracks and on low hummocks, and can also be seen in places n the adjacent saltmarsh. Several of the hollows topographically resembled dune slacks, although the fragmentary vegetation there consisted of typical fixed dune species and lacked any significant element of dune slack species. They were therefore not considered to be dune slacks. The moss, *Ditrichum flexicaule* was particularly abundant in these hollows.

The west side of the spit is bordered on the estuary side by saltmarsh vegetation, and there are occasional transitional zones, where fixed dune and saltmarsh vegetation are intermingled. Elsewhere, particularly where the landward fixed dune boundary is on the lee slope of tall dune ridges, there are abrupt boundaries to saltmarsh vegetation, and no transitional zones. The site digital map shows the irregular boundary between fixed dunes and saltmarsh.

Among the saltmarsh species noted in the transitional areas were *Armeria maritima* (Thrift), *Aster tripolium* (Sea aster), *Glaux marritima* (Se-milkwort), *Limonium* sp. (Sea lavender), *Plantago maritima* (Sea plantain), *Puccinellia maritima* (Common saltmarsh grass), *Suaeda maritima* (Annual sea-blite) and *Triglochin maritima* (Sea arrowgrass).

The fixed dune area to the south of Streedagh Point was generally less species-rich than that overlying the shingle spit. Grass species were more prevalent here, and *Cynosurus cristatus* (Crested dog's-tail) was particularly common. There were also numerous small clumps of *Rubus fruticosus* (Bramble) in this area. One notably common species here was *Primula vulgaris* (Primrose). The few small dune slacks at the site were found within this area. The fixed dunes here are bordered to the north by the housing development and also calcareous grassland or coastal grassland type vegetation, and to the south by agricultural land. The eastern margin of the habitat is bordered by the saltmarsh vegetation that fringes the west side of the estuary. The

seaward edge of the dunes is somewhat eroded, with slumping of fixed dune vegetation in places. Some of the slumped vegetation has been stabilised by *Ammophila arenaria* (Marram), while the disturbed nature of the dune edge here is illustrated by the common occurrence of *Cirsium arvense* (Creeping thistle). The beach is mostly composed of fine-grained sand, with occasional shingle or cobble.

Dune Slacks (H2190)

A few small dune slacks, some with 'wet type' vegetation and others of a more dry, mature type, were mapped in the fixed dune area southwards of Streedagh Point, and also on Conor's Island. Among the typical slack species noted were *Carex flacca* (Glaucous sedge), *C. nigra* (Common sedge), *Cardamine pratensis* (Cuckooflower), *Hydrocotyle vulgaris* (Marhs pennywort), *Mentha aquatica* (Water mint), *Potentilla anserina* (Silverweed) and *Prunella vulgaris* (Selfheal).

At least some of the slacks south of Streedagh Point have been damaged by the negative impacts of agricultural management regime of the area. One slack – indicated on the site digital map by a 'miscellaneous' point – had a combined cover of over 50% of *Cirsium vulgare* (Spear thistle) and *Senecio jacobaea* (Common ragwort).

There are several hollows in the fixed dunes along the shingle spit, in some of which erosion has exposed the underlying shingle substrate. All of these hollows were dry in nature, and characterised by fragments of a typical fixed dune flora. Consequently, they were not considered to be dune slacks. Some references to dune slacks in previous reports appear to refer to these hollows.

Mobile Dune (H2120)

The total mobile dune area of only 2.116ha, consisted of numerous small individual patches of habitat dispersed throughout the site. Several were along the seaward edge of the shingle spit that extends eastwards to Conor's Island, while others were around disturbed areas at access points, where their presence can probably be attributed to the local reworking of sediment. Two of the larger areas are at the south tip of Conor's Island and the adjacent north end of the shingle spit, where the tide flows through the

narrow gap or breach. The habitat was characterised by the presence of *Ammophila arenaria* (Marram), while *Tussilago farfara* (Colt's-foor) was also occasionally noted.

Along the small west-facing Trawgar beach to the south of Streedagh Point there were some narrow bands of freshly accreting *Ammophila arenaria* (Marram) in places, only one of which was sufficiently large to warrant mapping as mobile dune habitat. This small patch may be attributed to disturbance and localised reworking of sand around the beach access track.

Embryonic Dunes (H2110)

Embryonic dunes, which amounted in total to only 0.424ha for the entire site, were mapped on either die of the breach between the south end of Conor's Island and the eastern tip of the spit that extends towards the island. A further tiny segment was mapped along the eastern side of Conor's Island, while the remainder was along the small west-facing strand on Dernish Island. The habitat was characterised by the presence of *Elytrigia juncea* (Sand couch). The lack of foredune habitat throughout the site can be seen as a consequence of the significant erosion that seems to have occurred in recent times.

Shingle Vegetation (H1220)

The spit extending from Streedagh Point to Conor's Island is underalin by shingle, and is fronted along the seaward side by a wide shingle/boulder beach. Other small areas of shingle were noted at the site. However, all of the shingle banks were almost devoid of any substantial vegetation, and none were mapped as 'Perennial vegetation of stony banks'.

Annual Strandline (H1210)

A tiny patch of annual strandline vegetation, at the east end of the small west-facing beach at Dernish Island, amounted in total to 0.021ha. Such a meagre area is scarcely worth considering as a habitat, and does not warrant an assessment of conservation status. The more common strandline species noted at the site were *Cakile maritima* (Sea rocket) and *Honckenya peploides* (Sea sandwort).

IMPACTS

Activities observed or known to be impacting on the sand dune habitats at Streedagh Point are shown in Table 137B.

Table 137B Intensity and impact of various activities on sand dune habitats at Streedagh Point

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H2130	140	A	+2	60	Inside
H2190	140	A	0	0.1	Inside
H2130	149	B	-1	20	Inside
H2190	171	A	-1	0.1	Inside
H2130	400	A	-2	2.5	Inside
H2130	402	A	-2	2.5	Outside
H2120	420	C	-1	0.1	Inside
H2130	420	C	-1	0.2	Inside
H2130	608	A	-1	4	Inside
H2110	622	A	-1	0.2	Inside
H2120	622	A	-1	2	Inside
H2130	622	B	-1	40	Inside
H2110	623	A	-1	0.1	Inside
H2120	623	A	-1	1	Inside
H2130	623	A	-1	5	Inside
H2130	790	A	-1	0.2	Inside
H2110	900	B	-1	Unknown	Inside
H2120	900	B	-1	Unknown	Inside
H2130	900	B	-1	9	Inside

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

Recreational pressures at the site are undoubtedly high, as the site is highly scenic and attractive to visitors. The area would also experience a large influx of tourists in the summer months. The fine day on which the site survey was carried out saw numerous sunbathers, walkers and other users at the site (code 622). There are numerous pedestrian tracks in the fixed dunes, some of which are quite work and stripped of vegetation. Soil compaction was also observed on some of these tracks. Horse riding was also observed during the site visit and is known to be a regular fixture at the site, particularly as one of the regular trekking routes of a local riding school encompasses a considerable part of the site. Signage erected by Sligo County Council along the access road into the site advises the public of the Beach Bye-Laws (2000), which are the main mechanism at the disposal of the Council for controlling recreational use on the dunes and other habitats adjacent to the beach.

Unofficial use of the site for caravans and camping in summer (code 608) and the associated damage from off-road vehicles traversing the dunes (code 623) is thought to have a particularly destructive affect on the dunes. However, there was little evidence of these activities during the site visit, except for several small campfire or barbecue sites.

A gravel carpark (included under the 'miscellaneous' points on the site digital map) caters for a considerable number of vehicles. The dune area adjacent to the car park is particularly badly damaged due to trampling and the passage of off-road vehicles. The dunes here are generally not accessible to vehicles, although a jeep was observed in the dunes adjacent to the car park during the site visit. Dumping of fishing nets and other materials was also observed here (code 420). One of the few areas of mobile dunes mapped at the site is found here, and its presence may be due, at tleast in part, to the disturbance that causes the local recycling of sediment. However, the presence of a certain amount of unhealthy foredune grasses reflects the trampling and associated disturbance (code 720) that occurs here.

Stock grazing (code 140) of the dune grassland is by cattle, horses and sheep, although stock were absent from the shingle spit on the survey date. However, it appears that the fixed dune sward was not evenly grazed throughout. Towards the eastern end of the spit, there are undergrazed areas (code 149) with longer grass and lower species diversity. Most of the west side of the spit contains species-rich short turf. Rabbit burrows appeared to be more common on the western end of the spit, and their grazing has clearly helped to maintain the short sward that dominates this area. Conor's Island had a mix of short-grazed, lightly grazed, and rank, somewhat undergrazed sward, while the dune grassland to the south of Streedagh Point consisted mostly of a short sward, although agricultural weed species and scrub species were more common here.

Small scale dumping of farm waste (code 790) included silage bale remnants, although ring feeders were not seen at the site. However, damage caused to a dune slack to the south of Streedagh Point, in the form of a worn track leading to a large

patch of nitrophilous weeds, was typical of the damage that results from supplementary feeding of stock in small areas (code 171).

Natural erosion (code 900) threatens the stability of the dunes and underlying shingle along the spit that extends eastwards to Conor's Island. A reference in the re;event NATURA 2000 standard data form to 'good development' of mobile dunes at the site, and further references in the NATURA 2000 explanatory notes to the occurrence of mobile dunes along the full length of Streedagh Strand (Back Strand), suggests a recent depletion of sediment at the site. The current survey showed the habitat to be only very sparsely represented throught the site. However, erosion attributable to natural causes should be regarded as being of neutral impact.

A large area (mapped here as approximately 4ha) was developed as a housing estate in the mid-1970's (code 402). \although much of the surrounding land is now considered to be agricultural in nature and not part of the functioning dune system, an estimated 2.5ha of natural dune area (based on the site 6" map and observations during the site visit) was lost to this development. The housing and adjacent agricultural land are now excluded from the cSAC.

The taking/removal of flora (code 250), small scale collection of kelp cords (code 290) and water pollution (code 701) are all included in the relevant NATURA 2000 standard data form or site management plan as impacts of low intensity, although none could be verified during the current survey. Consequently, they are not included in Table 137B.

CONSERVATION STATUS

The overall conservation status assessment of each habitat at Streedagh Point dunes is based on a combination of *Habitat Extent*, *Structure & Functions*, and *Future Prospects* assessments (Table 137C). Details of the numbers and pass/failure rates of the monitoring stops used to assess habitat structure and functions are shown in Table 137D.

As Streedagh Point dunes cSAC encompasses only one sand dune system (in addition to other habitats such as saltmarsh), the information on habitat areas and habitat

condition in previous reports, such as the NATURA 2000 data forma dn explanatory notes, is more relevant to this survey than those that refer to designated sites that encompass a number of individual sand dune systems. Nevertheless, the less exacting methods of estimation for habitat extent used in the NATURA 2000 report indicate that these data are not directly comparable with those obtained in the present survey. Therefore, assessments of habitat area (extent) conservation status are, like those of structure and functions, largely based on the current condition of habitats.

Fixed Dunes (H2130)

Fixed dunes form the seaward boundary of the dunes along almost the entire shingle spit, and it is clear from the slumping of vegetation, and sometimes steeply eroded front face of the dunes, that erosion is currently occurring at a significant rate, and reducing the extent of the fixed dunes. However, it is difficult to determine whether erosion should be attributed mostly to natural erosion, or to quite high recreational pressures that exist at the site. Greater levels of damage or disturbance to the dunes at or near the main access points, indicates that at least some of the erosion is attributable to recreational use, and extent is therefore considered to be *unfavourable-inadequate*.

Of fourteen monitoring stops carried out, thirteen passed and one failed the overall criteria (Table 137D), indicating *unfavourable-inadequate* structure and functions. All eight stops carried out in the dune grassland along the narrow spit that extends from the west side of the spit to Conor's Island, passed the overall standard, as did three in the area of fixed dunes to the south of Streedagh Point. The single failed monitoring stop was one of three carried out on Conor's Island, and the failure to meet the overall criteria was attributable to both a lack of typical species and a percentage cover of negative indicator species that exceeded the allowable limit of 5%. The negative indicator species cover was accounted for by both *Cirsium arvense* (Creeping thistle) and *Lolium perenne* (Perennial rye-grass). Although *Senecio jacobaea* (Common ragwort) was a fairly constant element of fixed dune monitoring stops, most plants were low-growing and not reaching flowering size, and it was never recorded in sufficient quantities to exceed the negative indicator species limit.

As erosion, ar least some of which is being caused or exacerbated by amenity use of the site, is currently occurring at a significant rate in the fixed dunes, future prospects are considered *unfavourable-inadequate*. There are numerous breaches at the seaward edge of the dunes and there is probably a threat of breaching right through the narrow dunes along the shingle spit. An *unfavourable-bad* rating is avoided as much of the erosion appears to be due to natural events. Furthermore, the current grazing regime at the site appears to be compatible with the objectives of nature conservation and species diversity throughout much of the fixed dunes is notably high.

All of the individual parameters of conservation status are *unfavourable-inadequate*, indicating an overall *unfavourable-inadequate* assessment for the habitat.

The corresponding assessment thought most appropriate under the proposed Irish conservation system is *unfavourable-unchanged*, as it is likely that the habitat has been in a similar condition for some time.

In the NATURA 2000 standard data form, the fixed dunes were given a representativity ranking of 'A: excellent representativity', Both the Conservation Status Synthesis and Global Assessment were given a 'B' ranking, which denote good conservation and good value, respectively, although the degree of conservation of functions (part of the overall Conservation Status Synthesis) ws ranked as average or unfavourable prospects.

Table 137C Conservation status of Annex I sand dune habitats at Streedagh Point

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

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

Mobile Dunes (H2120)

Mobile dunes at Streedagh comprise only a few short strips, the largest of which are one at the western end of the spit, amounting to 0.362ha and extending over approximately 250m, and another of approximately 450m in length on the estuary side of the fixed dunes at Conor's Island. The presence of foredune vegetation at the former area may be due in part to recreational activities that cause disturbance to the dune structure, resulting in the local reworking of sediment. Such a poor representation and zonation of the habitat indicates an *unfavourable-bad* assessment for habitat area (extent).

Table 137D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Streedagh Point

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Fixed Dunes (H2130)	13	1	**Unfavourable - Inadequate**
Mobile Dunes (H2120)	1	1	**Unfavourable- Bad**
Dune Slack (H2110)	4	0	**Favourable**

Two monitoring stops, only one of which passed the overall required standard, were deemed sufficient for the very small area of habitat at the site. Both were carried out in the small strip of habitat at the western end of the spit. The disturbed nature of the area was reflected in the insufficient cover of typical species that brought about the failure of one of the stops. Both of the stops also had the maximum allowable cover of unhealthy *Ammophila arenaria* (Marram), probably reflecting the trampling that occurs here. The failure rate of 50% indicates *unfavourable-bad* structure and functions. A visual assessment of the other mobile dune areas at the sire confirmed that an overall failure rate of 50% of monitoring stops was appropriate.

Future prospects for the habitat must be considered *unfavourable-bad*. The meagre amount of habitat currently present is mostly in the area of highest recreational pressure, and the eroded nature of the dunes suggests that sediment depletion may be affecting the entire dune system.

Three *unfavourable-bad* assessments for the individual elements of conservation status indicate an overall *unfavourable-bad* conservation status assessment.

The corresponding Irish assessment thought most apt is *unfavourable-declining*, as it appears form other reports that the habitat has declined in area in recent times.

Embryonic Dunes (H2110)

Although there are no available data on the recent trend of embryonic dune development at the site, comments in the site management (MPSU) plan suggest a more extensive distribution of foredune habitats until relatively recently. In any case, based on the current condition of the habitat, which reflects a very limited area and poor zonation, extent is rated as *unfavourable-bad*. Most of the current occurrence of the habitat can be attributed to the local reworking of sediment around access tracks and other disturbed areas.

Monitoring stops were not carried out in the embryonic dunes due to the almost negligible area of habitat mapped. However, visual observations confirmed the generally good habitat conditions, with healthy growth of typical species – in this case

Elytrigia juncea (Sand couch) – and a lack of negative indicator species cover. Structure and functions may therefore be considered *favourable*.

Future prospects for the habitat should be considered *unfavourable-bad*. The current habitat extent is almost negligible, and most of it can probably be attributed to the local recycling of sediment from the eroding dunes. The lack of foredune development and ongoing erosion of dune grassland suggest the whole dune system is being depleted of sediment.

The inclusion of *unfavourable-bad* assessments in the individual conservation status parameters indicates an overall *unfavourable-bad* conservation status assessment.

The corresponding Irish assessment thought most appropriate is *unfavourable-declining*, as it appears that the habitat may have declined in recent times.

Dune Slacks (H2190)

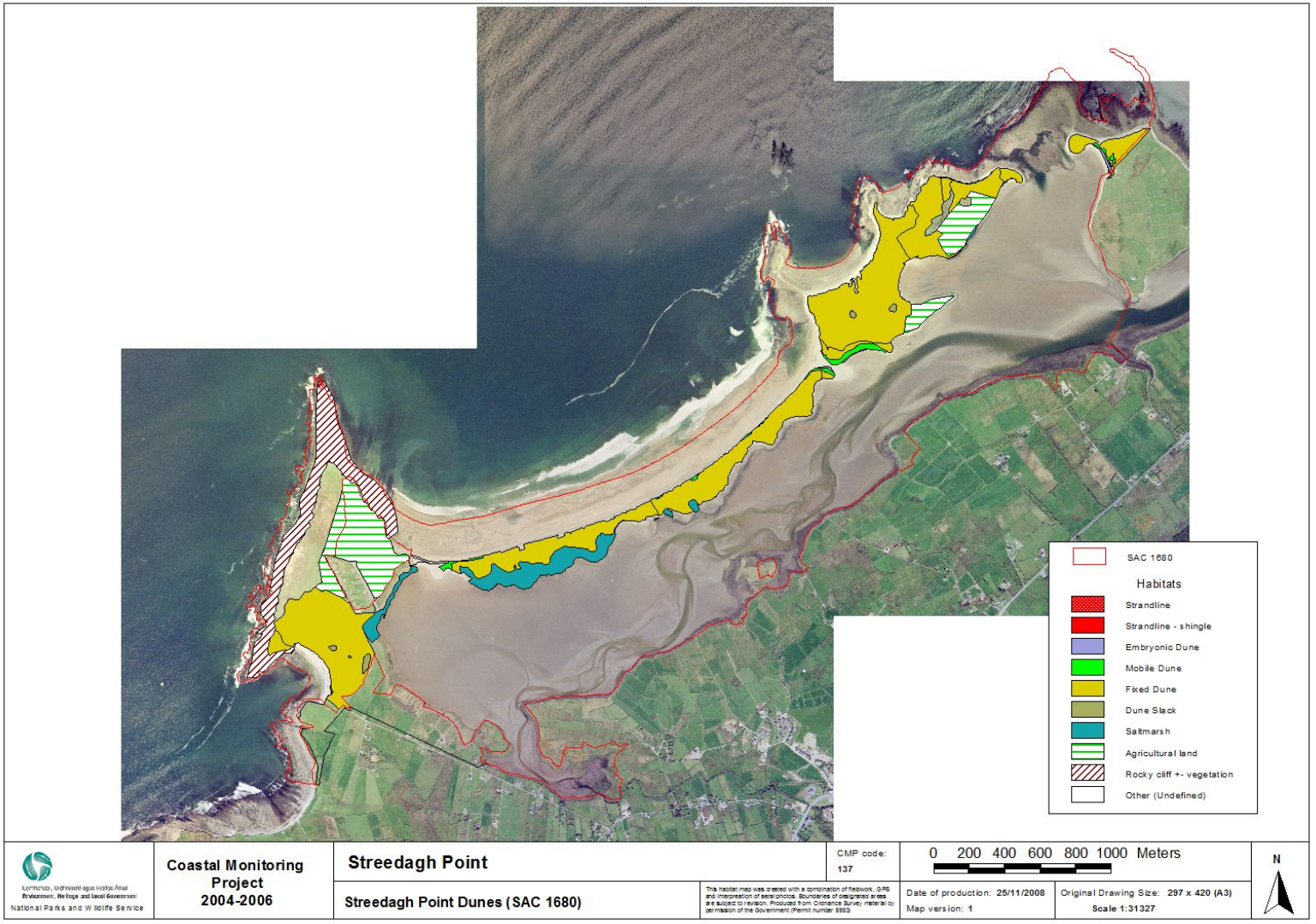
There are no reliable previous data on habitat extent with which the current results may be compared; so in the absence of any indication of recent loss, extent (area) is considered *favourable*. It appears from previous information on the site, that the hollows in the fixed dunes along the shingle spit have sometimes been considered as dune slacks. They are not considered to be slacks in the present report and dune slacks are not mapped in this area.

Four monitoring stops, two of which were carried out on Conor's Island and two in the dunes to the south of Streeedagh Point, all passed the target criteria. However, a dune slack to the south of Streedagh Point has been badly damaged by the apparent use of the area for supplementary feeding; a worn track leads into the slack and much of the adjacent area is now dominated by *Cirsium arvense* (Creeping thistle) and *Senecio jacobaea* (Common ragwort). A monitoring stop was not carried out here as a visual assessment confirmed the *unfavourable-bad* condition of the habitat. The presence of a significant area of damaged habitat demands an amendment to the monitoring stop result of *favourable* status. As this slack represents only a small proportion of the total slack area at this site, the assessment is revised to *unfavourable-indaequate* (Table 137D).

Most of the dune slacks at the site are in favourable condition, but the damage caused to some areas by the existing management regime suggests the future prospects should be considered *unfavourable-inadequate*.

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

The corresponding assessment thought to be most appropriate under the proposed Irish conservation system is *unfavourable-unchanged*, as the poor condition of the damaged area is likely to have existed for some time.


SAC 1680
Habitats
Strandline
Strandline - shingle
Embryonic Dune
Mobile Dune
Fixed Dune
Dune Slack
Saltmarsh
Agricultural land
Rocky cliff +- vegetation
Other (Undefined)
Coastal Monitoring Project 2004-2006
Streedagh Point
Streedagh Point Dunes (SAC 1680)
CMP code: 137
0 200 400 600 800 1000 Meters
N
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:31327
National Parks and Wildlife Service