Rogerstown Estuary SAC (site code 208)
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 and the Coastal Monitoring Project 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 (2013). Conservation Objectives: Rogerstown Estuary SAC 000208. 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.

Rogertsown Estuary SAC is a relatively small estuarine site separated from the sea by a sand and shingle bar. It is situated about 2km north of Donabate, Co. Dublin. The estuary is divided by a causeway and narrow bridge that was built in the 1840s to carry the Dublin-Belfast railway line. The estuary drains almost completely at low tide and has a wide salinity range, from near full sea water to near full fresh water. The estuary is funnel shaped and extends for about 6km from east to west and up to 2km at its widest. Saltmarsh fringes the estuary, especially the southern shores and parts of the outer spit. Salt meadows and wet brackish fields occur along the tidal river. A sandy peninsula stretches across the outer part of the estuary, restricting water flow to a channel of c. 200m in width. Low sand hills occur on the outer spit, including some small areas of fixed dune and *Ammophila* dunes. Fine sandy beaches and intertidal sandflats occur at the outer part of the estuary.

Rogerstown Estuary is of high importance to wintering wildfowl, and is rated as the most important estuary for wildfowl and waders in County Dublin after North Bull Island. It is designated as a Special Protection Area for birds (Rogerstown Estuary SPA, 4015) (see SPA conservation objectives supporting document (NPWS, 2013)). Much of the outer part of the estuary is owned by NPWS and has been designated as a nature reserve. Birdwatch Ireland own two plots of land on either side of the estuary and these areas are managed as a nature reserve (McCorry, 2007). Rush Golf Club is adjacent to the eastern part of the SAC.

Rogerstown Estuary SAC (site code: 208) is designated for a range of coastal habitats including, saltmarsh and sand dunes. The following five coastal habitats are included in the qualifying interests for the site (* denotes a priority habitat):

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

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

Embryonic shifting dunes and annual vegetation of driftlines were also recorded at this SAC by the Coastal Monitoring Project (CMP) survey (Ryle *et al*., 2009).

This backing document sets out the conservation objectives for the five coastal habitats listed above in Rogerstown Estuary Bay 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 latter of which is broken down into a number of attributes, including physical structure, vegetation structure and vegetation composition.

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

The SMP surveyed, mapped and assessed a total of one sub-site within Rogerstown Estuary SAC (McCorry, 2007):

- Rogerstown Estuary

The distribution of saltmarsh habitats within Rogerstown Estuary SAC is presented in Appendix I. As part of the SMP, a detailed report and habitat maps were produced for the sub-site and these are included in a set of Appendices to this document (Appendix II). The conservation objectives for the saltmarsh habitats in Rogerstown Estuary are based primarily on the findings of the report for the sub-site. There are additional areas of saltmarsh known to be present within the site, however, it is estimated that the sub-site as surveyed by the SMP represents most of the total area of saltmarsh within Rogerstown Estuary 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.

The CMP surveyed, mapped and assessed two sub-sites within Rogerstown Estuary SAC (Ryle *et al*., 2007):

- Rush
- Portrane

The distribution of sand dune habitats in Rogerstown Estuary SAC is presented in Appendix III. As part of the Coastal Monitoring Project (CMP) detailed individual reports and habitat maps were produced for each of the two sub-sites, which are included in a set of Appendices to this document (Appendices IV & V).

The conservation objectives for the sand dune habitats in Rogerstown Estuary are based on the findings of the individual reports for each of these sites, combined with the results of Gaynor (2008). It is thought that the two sub-sites as surveyed by the CMP represent the total area of sand dunes within Rogerstown Estuary SAC.

2 Conservation Objectives

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

3 Saltmarsh habitats

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

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

Three of the habitats above (in bold) are listed as Qualifying Interests for Rogerstown Estuary SAC. The last habitat is restricted in its distribution to sites in the southeast of the country.

The distribution of saltmarsh habitats in Rogerstown Estuary SAC is presented in Appendix II. The SMP surveyed, mapped and assessed a total of one sub-site within Rogerstown Estuary SAC (McCorry, 2007).

- Rogerstown Estuary (Appendix II)

Within Rogerstown Estuary SAC, ASM and *Salicornia* flats are particularly well represented. MSM is present only in small amounts along the southern side of the inner estuary. Detailed descriptions of each habitat in the sub-site recorded by McCorry (2007) in Rogerstown Estuary can be found in Appendix III.

3.1 Overall Objectives

The overall objective for '*Salicornia* and other annuals colonising mud and sand' in Rogerstown Estuary SAC is to '*maintain the favourable conservation condition'*.

The overall objective for 'Atlantic salt meadows' in Rogerstown Estuary SAC is to '*restore the favourable conservation condition*'.

The overall objective for 'Mediterranean salt meadows' in Rogerstown Estuary SAC is to '*maintain the favourable conservation condition*'.

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

3.2 Area

3.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target is no decrease in extent from the baseline which was established by McCorry (2007). Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is assessed subject to natural processes, including erosion and succession.

A baseline habitat map was produced for the saltmarsh in Rogerstown Estuary during the SMP. This map is included with the individual site report at the end of this document (Appendix II).

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 Rogerstown Estuary 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 *Salicornia* mudflats (excluding mosaics) from SMP**	**Total area (ha) of *Salicornia* mudflats within SAC boundary (including mosaics)**
Rogerstown Estuary	0.904	0.904
Total	**0.904**	**0.904**

Note: the individual site report for Rogerstown Estuary produced by the SMP (Appendix II) states that the total area of this habitat is 2.6ha, however, the actual area indicated on the GIS element of the project suggests that it should be 0.904ha.

The target for *Salicornia* mudflats habitat is that their areas should be stable or increasing, subject to natural processes, including erosion and succession

Sub-site	**Total area (ha) of ASM (excluding mosaics) from SMP**	**Total area (ha) of ASM within SAC boundary (including mosaics)**
Rogerstown Estuary	33.02	37.178
Total	**33.02**	**37.178**

The target for ASM habitat is that their areas 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)**
Rogerstown Estuary	1.57	2.180
Total	**1.57**	**2.180**

The target for MSM habitat is that their areas should be stable or increasing, subject to natural processes, including erosion and succession.

3.3 Range

3.3.1 Habitat distribution

The SMP sub-divided Rogerstown Estuary into the following four sub-sections:
1. Portrane Burrow
2. Outer Estuary
3. Inner Estuary (Southern side)
4. Inner Estuary (Northern side)

Salicornia mudflats habitat occurs at several locations within the inner and outer estuary. Small strips of glasswort (*Salicornia* sp.) between 1-5m wide occur along the seaward edge of the ASM, along the southern side of the inner estuary. Narrow strips of this habitat 2-5m wide are also situated along the edge of the berm along the northern side of the inner estuary. This habitat also occurs at the tip of Portrane Burrow as a narrow strip about 5m wide on sandy mud. This habitat also occurs on the south-eastern corner of the outer estuary, where small patches of *Salicornia* flats occur on a narrow band of exposed mud between the *Spartina* swards and the ASM vegetation along the shore (McCorry 2007).

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.

3.4 Structure and Functions

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

3.4.1 Physical structure: sediment supply

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

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

3.4.2 Physical structure: creeks and pans

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

The saltmarsh topography is well developed in most of the larger sections of the ASM and there is a very complex creek and salt pan structure, particularly in the area adjacent to Beaverstown Golf Club and within the BirdWatch Ireland Reserve along the northern creek. The creeks are functioning adequately though there has been some disturbance of the drainage of the saltmarsh with several drains crossing from adjacent land (McCorry, 2007).

There are occasional salt pans present within the MSM habitat. Creeks do not generally reach this high up the saltmarsh but there are channelised drains from adjacent lands that pass through this habitat.

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

3.4.3 Physical structure: flooding regime

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

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

3.4.4 Vegetation structure: zonation

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

In the outer estuary at Portrane Burrow, there are zonations between saltmarsh and sand dune habitats (McCorry, 2007; 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.

3.4.5 Vegetation structure: vegetation height

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

Much of the saltmarsh in Rogerstown Estuary is not grazed by livestock and has a relatively high sward height, particularly in the grassy mid-upper marsh areas. However, hares and waterfowl do graze on the saltmarsh and the mid-marsh zone has a typical natural low sward height (McCorry, 2007).

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

3.4.6 Vegetation structure: vegetation cover

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

The saltmarsh at Portrane is affected by some impacts and activities related to amenity use, that impact negatively on the vegetation cover. Cars park on the flat saltmarsh to access

Portrane Strand. There are also wheel ruts in places all over the saltmarsh. A sandy track is situated along the western side of the saltmarsh that accesses the northern shoreline. There are frequent tracks on the saltmarsh and sand dunes from walkers and horse riders (McCorry, 2007).

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

3.4.7 Vegetation composition: typical species & sub-communities

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

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

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

Species of local distinctiveness were recorded within the SAC. Meadow barley (*Hordeum secalinum*), a plant listed in the Flora (Protection) Order, is present within this site and has been recorded in some of the brackish hollows, particularly in Newhaggard along the north side of the inner estuary (McCorry, 2007).
The conservation value of the saltmarsh at Rogerstown Estuary is also enhanced by the presence of rock sea lavender (*Limonium binervosum*), a Red Data Book Species (Curtis & McGough, 1988). This species is present in the sandier parts of the mid marsh zone and is associated with patches of bare substrate (McCorry, 2007).

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

3.4.8 Vegetation structure: negative indicator species

The only invasive and non-native species recorded on saltmarshes during the SMP was common cordgrass (*Spartina anglica*). This species was recorded frequently in Rogerstown Estuary SAC by the SMP where it forms swards on the intertidal mudflats and mosaics with ASM (McCorry, 2007).

The aim is that negative indicators such as *Spartina* should be absent or under control. The current target for this particular site is no significant expansion and an annual spread of less than 1%.

4 Sand dune habitats

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

In Ireland, there are 9 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) *

Four dune habitats were recorded by Ryle *et al*. (2009) in Rogerstown Estuary SAC but only the two habitats indicated in bold above are listed as Qualifying Interests..

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

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

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

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

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

The CMP surveyed two sub-sites within Rogerstown Estuary SAC:

1. Rush Sandhills (Appendix IV)
2. Portrane (Appendix V)

These sub-sites occur on either side of the mouth of the estuary, Rush Sandhills to the north and Portrane to the south. The Portrane sand dune system is located on a sand spit known as Burrow Peninsula, which partly covers the mouth of the outer section of the Rogerstown Estuary. The narrow band of sand dune edges the eastern and northern side of the spit. A saltmarsh occurs behind the sand dunes at the northern tip (Ryle *et al*., 2009). Rush Sandhills are located northeast of the mouth of Rogerstown Estuary. A small beach and narrow band of sand dune occurs south of Rush Village (Ryle *et al.,* 2009).

Detailed descriptions from the Coastal Monitoring Project (CMP) (Ryle *et al.,* 2009) of each sand dune habitat found at Rush Sandhills and Portrane are presented in Appendices IV & V.

4.1 Overall objectives

The overall objective for 'Shifting dunes along the shoreline with *Ammophila arenaria*' in Rogerstown Estuary SAC is to 'restore the favourable conservation condition'.

The overall objective for 'Fixed coastal dunes with herbaceous vegetation' in Rogerstown Estuary 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. A baseline habitat map was produced for the sand dune habitats at each sub-site in Rogerstown Estuary SAC during the Coastal Monitoring Project (CMP) (Ryle *et al*., 2009). These maps are included with the individual site reports in the Appendices at the end of this document.

At Rush Sandhills, a narrow band of highly disturbed mobile dunes extend the length of the beach. The mobile dunes occupy 0.979ha of the sand dune habitat. The fixed dune habitat at this sub-site, comprises 3.363ha of the total sand dune habitat. The fixed dune has been largely modified by Rush Golf Course and urbanisation. The remaining fixed dune habitat is fragmented and fringes the seaward edge of the golf course (Ryle *et al.,* 2009).

At the Portrane sub-site, the mobile dunes are largely confined to the centre section of the site due to erosion in the north and pressure from human activities in the south and accounts for 1.232ha of sand dune habitat. The fixed dune habitat at this sub-site occupies 5.712ha of the total sand dune habitat. This excludes approximately 40ha that have been lost to housing and caravan parks (Ryle *et al*., 2009).

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*	2.211	2.559
Fixed coastal dunes with herbaceous vegetation	9.075	8.367
Total	**11.286**	**10.926**

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

4.3 Range

4.3.1 Habitat distribution

There are two areas of sand dune, at Portrane and Rush Sandhills, which lie on opposite sides of the mouth of the estuary.

The distribution of sand dune habitats as mapped by Ryle *et* al. (2009) is presented in Appendix III. The strandline, embryo dune, mobile dune and fixed dune, were recorded at Portrane. These habitats with the exception of strandline habitat were also recorded at Rush Sandhills.

Fixed dunes is the most abundant sand dune habitat within the SAC, with the greatest area at Portrane covering 5.712ha (Ryle *et al*., 2009).

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

4.4 Structure and Functions

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

4.4.1 Physical structure: functionality and sediment supply

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

coastal erosion is part of a natural tendency towards equilibrium. Natural shorelines attempt to absorb the energy entering the coastal zone by redistributing sediment.

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

At Rush Sandhills, a seawall has been built at Rush Sailing Club and is likely to impact on sediment dynamics in the southern part of the site (Ryle et al., 2009).

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

4.4.2 Vegetation structure: zonation

The range of vegetation zones on a dune system should be maintained. Gaynor (2008) highlights the highly transitional nature of much of the vegetation; therefore, it is important that the transitional communities are also conserved, including those to the saltmarsh communities.

At both sub-sites within this SAC, there are transitions between sand dune habitats. At Portrane sub-site there are also transitions to saltmarsh habitats.

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

4.4.3 Vegetation structure: bare ground

This target only 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 (e.g. mobile dunes). In the fixed and slack areas some degree of instability is vital. Constant cycles of erosion and

stabilisation provide the necessary conditions for the establishment of pioneer species and species that favour open conditions including invertebrates, helping to increase biodiversity.

The dunes and beach at Rush Sandhills are used for walking and horse riding and erosion induced by recreational activities and signs of overuse is apparent with a lot of tracks running through the dunes especially towards the northern end (Ryle *et al.,* 2009).

The fixed dunes at Portrane are also subject to high recreational pressure as seen by the numerous tracks running through them (Ryle *et al.* 2009).

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

4.4.4 Vegetation structure: vegetation height

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

Grazing by livestock is absent from both CMP surveyed subsites in Rogerstown Estuary. At Rush Sandhills, there are some small patches of rabbit grazed short turf surrounded by rank marram-dominated areas within the fixed dunes (Ryle *et al*., 2009).

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

4.4.5 Vegetation composition: plant health of dune grasses

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

Monitoring stops by the CMP within mobile dunes at Portrane had a high cover of unhealthy specimens of marram (*Ammophila arenaria*) (Ryle *et al*., 2009).

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

4.4.6 Vegetation composition: typical species & sub-communities

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

The Portrane and Rush Sandhills sub-sites support a characteristic dune flora, details of which can be found in the site report from the CMP (Ryle *et al.,* 2009) which is included in Appendix IV and V.

Four Red Data Book plant species have been recorded from this SAC site including green-winged orchid (*Orchis morio*), hairy violet (*Viola hirta*), meadow barley (*Hordeum secalinum*) and rough poppy (*Papaver hybridum*). The last three are also listed under the Flora (Protection) Order (1999) and are legally protected. Green-winged orchid (*Orchis morio*) and hairy violet (*Viola hirta*), which have been previously recorded at fixed dunes at Portrane, were not found during the Coastal Monitoring Project (Ryle *et al.,* 2009). Other rare elements of the site flora include hound's tongue (*Cynoglossum viride)*, which was recorded in fixed dunes at Rush Sandhills by the CMP. This species is becoming rare in Ireland due to a decline in suitable habitat as a result of overgrazing and development (Ryle *et al*., 2009).

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

4.4.7 Vegetation composition: negative indicator species

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

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

Spear thistle (*Cirsium vulgare*) and sea buckthorn (*Hippophae rhamnoides*) occur occasionally in the mobile dunes at Rush Sandhills. At Portrane, ragwort (*Senecio jacobaea*) occurs occasionally in the mobile dunes (Ryle *et al*. 2009).

Bracken (*Pteridium aquilinum*) was recorded in fixed dune at Portrane along with spear thistle (*Cirsium vulgare*), ragwort (*Senecio jacobaea*), and bramble (*Rubus fruticosus*). Sea buckthorn (*Hippophae rhamnoides*) has been planted at the southern end of the site and is extending in to the fixed dune. Sea buckthorn (*Hippophae rhamnoides*) also occurs at Rush Sandhills and covers approximately 20% of the fixed dune area. Spear thistle (*Cirsium vulgare*) and ragwort (*Senecio jacobaea*) also occur in the fixed dunes at Rush (Ryle *et al*., 2009).

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

4.4.8 Vegetation composition: scrub/trees

This attribute only applies to the fixed dunes. Scrub encroachment leads to reduction in dune biodiversity and needs to be controlled.

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

5 References

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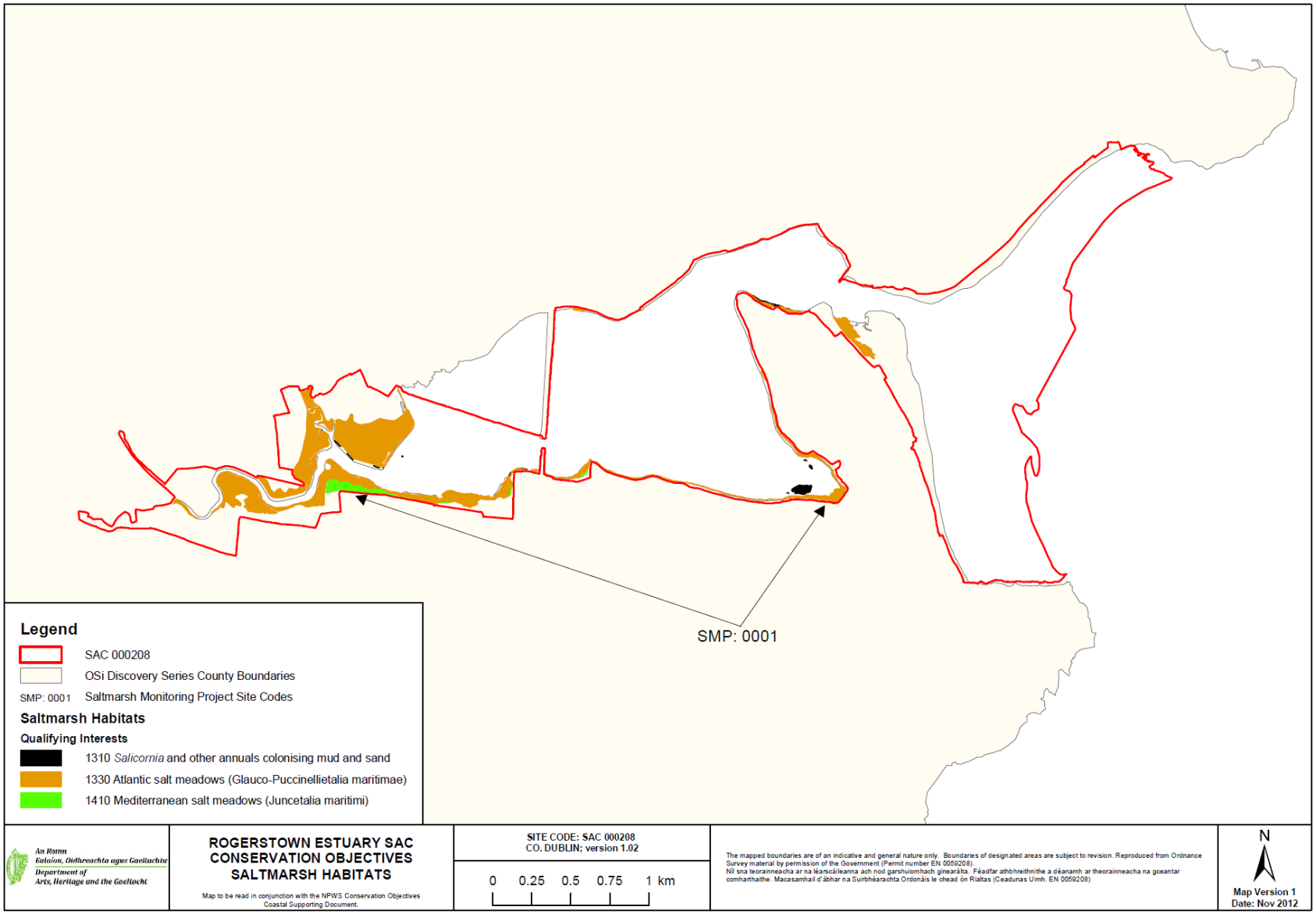
Appendix I – Saltmarsh habitats distribution map within Rogerstown Estuary SAC.



Appendix II – Rogerstown Estuary site report and habitat map from the SMP (McCorry, 2007)

SITE DETAILS

SMP site name: **Rogerstown Estuary**		SMP site code: **SMP0001**
Site name (Curtis list): **Rogerstown Estuary**		CMP site code: **6 (Portrane)**
		Site No: (Curtis list): **233**
NPWS Site Name: **Rogerstown Estuary**		Dates of site visit **23/06, 19/07 & 20/07/2006**
NPWS designation	cSAC: **208**	MPSU Plan: **old format plan available**
	pNHA: **208**	
	SPA: **Rogerstown Estuary SPA 15**	
	Nature Reserve: **Rogerstown Estuary IE01 (S.I. No.71 of 1988)**	
	Wildfowl Sanctuary: **Rogerstown Estuary Wildfowl Sanctuary IE05**	
County: **Dublin**		Discovery Map: **43** Grid Ref: **321580, 251580**
6 inch Map No: **Du008**		Aerial photos (2000 series): **02857-b, 02857-d 02858-a, 02858-b, 02858-c, 02858-d, 02859-a, 02859-c, 02790-d, 02791-d**
Annex I habitats currently designated for Rogerstown Estuary cSAC: ***Salicornia* and other annuals colonizing mud and sand (1310)** **Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (1330)** **Mediterranean salt meadows (Juncetalia maritimi) (1410)**		
Saltmarsh type: **Estuary**		Substrate type: **Mud/Sand**

SITE DESCRIPTION

Rogerstown Estuary is a relatively small-sized estuary situated in north County Dublin. It is situated 2 km north from Donabate and 3 km south from Rush. This part of Co. Dublin is low-lying and dominated by agricultural land with arable crops prominent. There are also many urban areas of various sizes around the estuary. The estuary is divided into two main sections by the Belfast-Dublin railway line, which crosses a viaduct built in the 19th Century. The outer larger section contains a large area of intertidal mudflats and is partially enclosed from the sea by Portrane Burrow. There is a small connection between the estuary and the sea north of Portrane Burrow. The smaller inner section is fed by the Ballyboghil and Ballough Rivers. There is a large opening in the embankment that allows the tide to flood the inner section, although not all tides (low neaps) will flood the inner estuary. A large part of the north-east corner of the inner estuary has been infilled by the Ballealy Landfill. Rogerstown Estuary cSAC extends westward a river channel to the A1 Dublin-Belfast Road, which is located at Daws Bridge and is orientated north-south. Some areas

adjacent to the inner part of the estuary contain low-lying land that was formerly enclosed by berms and was reclaimed, but is now reverting back to saltmarsh.

Three Annex I saltmarsh habitats, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM), are found at this site. All three habitats are listed as qualifying interests for Rogerstown Estuary cSAC. *Spartina* swards are also present at this site and are also listed on the Natura 2000 form as a qualifying interest. Saltmarsh habitats are located in the inner and outer estuary and on Portrane Burrow. O'Reilly and Pantin (1957) surveyed the saltmarshes of Rogerstown Estuary in the 1950's and this information serves as a good comparison to the current status.

Nearly all of the Annex I saltmarsh habitats are situated within the cSAC. There are some sections outside the cSAC boundary. The main excluded area is located at Whitestown along the north-eastern corner of the outer estuary. This section of saltmarsh was originally included in the cSAC but has been excluded from the latest version. Other small patches of saltmarsh habitat are excluded all around the boundary. These unintentional exclusions are probably related to the poor rectification in some cases between the map features used to draw the cSAC boundary and the 2000 series aerial photo, or may be result of the SAC appeals process.

Rogerstown Estuary cSAC also includes a large section of Portrane Burrow, which contains a sand dune system. This sand dune system (and associated saltmarsh) was surveyed by the Coastal Monitoring Project in 2004. Several rare plant species are also present in the Burrow. The estuary is important for wintering waders and wildfowl and the outer estuary has also been designated as an SPA. The site holds international important numbers of Brent Geese as well as nationally important numbers of Greylag Goose, Shelduck, Teal, Pintail, Shoveler, Oystercatcher, Ringed Plover, Golden Plover, Grey Plover, Lapwing, Knot, Dunlin, Sanderling, Black-tailed Godwit, Curlew, Redshank and Greenshank. Most of the outer part of the estuary is owned by NPWS and has been designated as a nature reserve. Birdwatch Ireland own two plots of land on either side of the inner estuary and these areas are managed as a nature reserve.

Two plant species, which are legally protected under the Flora (Protection) Order, 1999, occur within the site: Hairy Violet (*Viola hirta*) occurs on the sand spit and Meadow Barley (*Hordeum secalinum*) occurs in the saline fields of the inner estuary.

This species has declined apparently due to reclamation and embankment of lands fringing the estuaries. Another rare species, Green-winged Orchid (*Orchis morio*), occurs in the sandy areas of the outer estuary.

The site was accessed from several locations around the estuary. Portrane Burrow was accessed via roads that lead to the beach from Portrane Village. The eastern section of the outer estuary was accessed by following the coastline around the spit. There was another access point at the south-eastern corner of the outer estuary where a minor road is situated close to the coastline. The western part of the outer estuary was accessed via a minor road that leads to Beaverstown Golf Course. The northern part of the outer estuary was accessed via a track that runs along the coastline. The southern part of the inner estuary was accessed via tracks that lead to Birdwatch Ireland's hide, through allotments owned by Fingal County Council. The northern part of the inner estuary was accessed via a track that leads to Birdwatch Ireland's northern hide.

HABITATS

3.1 General description

Saltmarsh habitats at this site can be divided into a series of sub-sites and described separately. Overall, Atlantic salt meadows are the most common saltmarsh habitat (Table 3.1). There are only small amounts of *Salicornia* flats and Mediterranean salt meadows. The cover of *Spartina* swards is about 40% of the total amount of the other saltmarsh habitats.

3.1.1 Portrane Burrow

Saltmarsh at this location is dominated by Atlantic salt meadows (ASM). This saltmarsh is found in a sheltered location with sand dunes protecting the saltmarsh along the eastern seaward edge. There has been a recent blow-out in the dunes at this location since the site was surveyed by the CMP team in 2004. The saltmarsh is flooded from the northern side where there is one main creek. Old sand dunes are also present along the landward boundary.

There are also several small patches of saltmarsh along the northern side of Portrane Burrow. These are long and quite narrow and have developed in some sheltered patches of the shoreline. The saltmarsh is dominated by ASM with a strip of

Salicornia flats at the seaward side. This saltmarsh borders sandflats on the seaward side and improved grassland on the landward side.

3.1.2 Outer Estuary

There are several patches of saltmarsh around the fringes of the outer estuary. Most of the saltmarsh is dominated by *Spartina* swards. These are best developed in the south-east corner and the north-west corner of the estuary. The sward extends as a narrow band along the southern edge of the estuary. Scattered clumps on mud are also associated with the denser swards. There are some patches of *Salicornia* flats also in the south-eastern corner of the outer estuary, adjacent to clumps of Common Cordgrass (*Spartina anglica*). ASM is located along the southern side of the estuary, although there is a relatively small amount and it has mainly developed as a narrow strip bordering the *Spartina* sward. ASM becomes somewhat wider in the two southern corners of the outer estuary. The ASM generally transitions to a narrow band of Twitch (*Elytrigia repens*)-dominated grassland before the development of the mature hedgerows marking the terrestrial boundaries. There is also a small patch of MSM in the south-western corner of the estuary.

There is also a patch of ASM saltmarsh in an enclosure located at the north-eastern corner of the estuary at Whitestown. This saltmarsh is mainly enclosed from the sea, but is still flooded via two drains/creeks that drain this area. The saltmarsh at this location is more brackish than standard ASM and has been disturbed by excavation in the recent past and by older attempts at reclamation. Saltmarsh at this location transitions into Twitch-dominated grassland on higher ground.

3.1.3 Inner Estuary (southern side)

Saltmarsh extends along nearly all of the southern side of the inner estuary. The seaward side of these saltmarsh habitats are marked by mudflats on quite steeply sided channels. The saltmarsh is dominated by ASM. Mediterranean salt meadows (MSM) also occur in a large block in the central section (west of the Birdwatch Ireland hide) and to the landward side of the ASM. Common Cordgrass is present along most of the saltmarsh. Several sections at the seaward side of the ASM have been classified as either *Spartina* swards or mosaics between *Spartina* swards and ASM. Further west the channel narrows and a tall berm or embankment follows the edge of the channel. This berm was built to exclude the tide and reclaim low-lying

land (former saltmarsh) behind the berm. There is a narrow strip of ASM saltmarsh along the channel side of the berm extending quite high up the river channels before petering out where the tide becomes less influential and brackish habitats with stands of Sea Club-rush (*Bolboschoenus maritimus*) and Common Reed (*Phragmites australis*) develop. The berm has not been maintained and is breached in several locations. This has led to the restoration of ASM on land behind the berms. This ASM is still quite disturbed and in the process of succession back to ASM.

The landward boundaries of the saltmarsh are marked by several features. The eastern point is enclosed by the railway embankment. Beaverstown Golf Course is situated along the landward side of the eastern part of the saltmarsh and there are some low embankments or drains separating the saltmarsh from the higher land of the golf course. There are occasional patches of Common Reed at the landward side of the saltmarsh. Further west of the golf course there is arable land or improved grassland in various stages of management along the landward side of the saltmarsh. This arable land or grassland occupies higher land and there is usually a mature hedgerow or treelike marking the boundary. Further west (west of the bird hide) drains and embankments are situated along the back of the saltmarsh. Much of the adjacent land contains unmanaged rank grassland with some scrub encroachment. Some of this grassland is dominated by Twitch and can be classified as upper saltmarsh (CM2). The Twitch dominated areas can be classified as upper saltmarsh (CM2) but are not classified as ASM because this community does not fit into the Glauco-Puccinellietalia maritimae (Rodwell 2000).

3.1.4 Inner Estuary (north side)

The northern side of the inner estuary has a similar morphology and landscape to the southern side. Ballealy Landfill has infilled a large section of the estuary (and probably some saltmarsh) at the north east corner adjacent to the railway embankment. *Spartina* swards have developed extensively on mudflats between the landfill and an embanked area which is part of Newhaggard. This embanked area has a berm around its edge. However, this berm has been unmanaged and is breached at several locations. ASM saltmarsh has developed behind the berm and this area is grazed by horses. Further west there is a small intricate channel leading northwards from the estuary. Birdwatch Ireland own saltmarsh on both sides of the channel and the large area behind the berm. The topography of this section is quite complex,

particularly higher up the channel. Saltmarsh on both sides of the channel is dominated by ASM. Further south, Common Cordgrass is prominent within the established saltmarsh and a large area is classified as a mosaic of *Spartina* sward and ASM. ASM continues westwards where the estuary narrows into a small channel. This area is also embanked with a large berm. There has been some re-establishment of ASM saltmarsh in low-lying areas behind the berm.

The landward boundary of the saltmarsh is generally marked by old embankments or berms and may be associated with drains. There are still signs of old saltmarsh creeks in these reclaimed areas and some saltmarsh vegetation may extend along some of these creeks that are still active as drainage channels. Much of the land adjacent to the saltmarsh along the northern side of the inner estuary contains rank grassland dominated by Twitch, (which can be classified as upper saltmarsh CM2).

Table 3.1. Area of EU Annex I habitats listed at Rogerstown Estuary.

EU Code	Habitat	Area (ha)
1310	*Salicornia* and other annuals colonizing mud and sand (1310)	2.6
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	33.02
1410	Mediterranean salt meadows (Juncetalia maritimi)	1.57
	Spartina swards	15.79
	Total (not including *Spartina* swards)	**37.49**

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

This habitat occurs at several locations within the inner and outer estuary. Small strips of Glasswort (*Salicornia* sp.) between 1-5 m wide occur along the seaward edge of the ASM, along the southern side of the inner estuary. These patches are dominated by Glasswort and also contain rare individual plant of Greater Sea-spurrey (*Spergularia media*) and Common Saltmarsh-grass (*Puccinellia maritima*). There is no transition between the patches of *Salicornia* flats and the ASM as the boundary is the ASM cliff. Patches of *Salicornia* flats along the ASM are located at the eastern end of the southern inner estuary adjacent to the railway embankment. These patches have more frequent Annual Sea-blite (*Suaeda maritima*) along with abundant Glasswort.

Narrow strips of this habitat 2-5 m wide are situated along the edge of the berm along the northern side of the inner estuary. Glasswort has vegetated a strip of mud along

the eroded edge of the berm where old car wrecks are being exposed. Glasswort has also vegetated small raised platforms to the seaward side of the *Spartina* sward that occupies the mudflats adjacent to the Ballealy Landfill. These patches are occupying areas where Common Cordgrass has died back in places.

This habitat also occurs along the saltmarsh at the tip of Portrane Burrow. Here, there is a narrow strip about 5 m wide on sandy mud dominated by Glasswort and also containing occasional or rare Common Saltmarsh-grass, Greater Sea-spurrey, Annual Sea-blite and Lax-flowered Sea Lavender (*Limonium humile*). There is an abrupt boundary between the *Salicornia* flats and the ASM, marked by a low ASM cliff.

This habitat is also present in the south-eastern corner of the outer estuary. At the northern side, some small patches of *Salicornia* flats occur on a narrow band of exposed mud between the *Spartina* swards and the ASM vegetation along the shore. There are also small patches further out to the seaward side of the *Spartina* swards on slightly raised mounds. This is the only location where clumps of Common Cordgrass occur in association with the *Salicornia* flats.

3.3 Atlantic salt meadows (H1330)

3.3.1 Inner Estuary (southern side)

The ASM along the southern part of the inner estuary has a saltmarsh cliff 0.3-0.4 m high (east of the bird hide). Sometimes the cliff height increases to 1 m. There are occasional signs of erosion along the cliff with mud balls forming. The ASM along this part of the estuary shows saltmarsh plant community zonation. The lower saltmarsh zone along the saltmarsh cliff is dominated by Common Cordgrass, Sea Purslane (*Atriplex portulacoides*) and frequent Lax-flowered Sea Lavender, along with Glasswort. The salt pan structure is generally quite poor in this zone and there are few pans present. There are occasional small clumps of Common Cordgrass along the seaward side of the saltmarsh cliff to the east of the bird hide.

Along most of the inner estuary Common Cordgrass has established on the existing ASM and formed patches of *Spartina* swards with some ASM species. It was sometimes difficult to map the ASM and the *Spartina* swards as there was quite variable cover of Common Cordgrass on the established saltmarsh and it occurred in a mosaic with the ASM. *Spartina* swards were mapped on established saltmarsh where the overall cover was greater than 40%, although the cover within these areas varied

considerably (mainly between 20-75%) and there were sometimes small patches of ASM with no Common Cordgrass.

This lower zone transitions into a middle marsh zone dominated by Sea Pink (*Armeria maritima*) and Sea Plantain (*Plantago maritima*). Other species present include Greater Sea-spurrey, Common Saltmarsh-grass, Sea Arrowgrass (*Triglochin maritimum*), Sea Aster (*Aster tripolium*), Sea Milkwort (*Glaux maritima*) and Annual Sea-blite. This zone has a typical low sward height. The saltmarsh creek and pan topography is well developed in this zone, particularly in the area adjacent to Beaverstown Golf Course. There are clumps of Common Cordgrass of various sizes scattered through the middle marsh zone but generally has an overall cover of < 5%. Common Cordgrass has infilled some of the large salt pans and some old creeks. There are several deep large drains that cut across the saltmarsh and lead from drains in Beaverstown Golf Course.

A mid-upper ASM saltmarsh zone has also developed in this part of the saltmarsh (adjacent to Beaverstown Golf Club) with grassy patches dominated by Saltmarsh Rush (*Juncus gerardii*) and Red Fescue (*Festuca rubra*), along with Sea Aster, Sea Milkwort and Common Scurvy-grass (*Cochlearia officinalis*). Sea Purslane colonises some patches in pans, as does Common Cordgrass. Sea Beet (*Beta maritima*) colonises some of the low mounds that are situated near the drift line level.

Upper zone ASM vegetation occupies slightly raised parts of the saltmarsh further west of the bird hide. These patches are dominated by Red Fescue with frequent Sea Milkwort, Sea Plantain, and occasional Lax-flowered Sea Lavender and Sea Purslane. These raised areas are not uniform and there are patches of lower zone saltmarsh dominated by Common Saltmarsh-grass in lower hollows and channel-like areas, sometimes to the landward side of these raised sections.

Further west, the ASM is confined to a narrow strip along a high berm. Saltmarsh pans are still present and the ASM vegetation is dominated by the middle-marsh zone (Sea Pink and Sea Plantain). The berm is vegetated with Twitch, Creeping Bentgrass (*Agrostis stolonifera*) and occasional Nettle (*Urtica dioica*) and Creeping Thistle (*Cirsium arvense*) on the top.

This narrow band of ASM saltmarsh eventually transitions to more brackish vegetation. Saltmarsh Rush and Sea Plantain become prominent, with Sea Aster,

Creeping Bentgrass and Common Scurvygrass also present. Species such as Curled Dock (*Rumex crispus*) and Twitch appear within the ASM vegetation. There are also patches of Grey Club-rush (*Schoenoplectus tabernaemontani*).

The area on the inside of the berm contains some disturbed ASM vegetation. Most of this area was probably reclaimed at one stage for agricultural use. A deep drain runs along the inside of the berm. There are several breaches along the berm allowing the tide to flood this drain and flood this area but most of the berm is still intact and in good condition. The vegetation varies between lower hollows with saltmarsh vegetation along side slightly raised sections dominated by Twitch and Sea Couch-grass (*Elytrigia pycnanthus*). There is a complex network of vegetated channels and some large old bare pans still present in this area and ASM vegetation is present along many of this old channels. The ASM vegetation is dominated by Common Saltmarsh grass in places with frequent Sea Plantain, Sea Arrowgrass, Saltmarsh Rush and Sea Aster. Some Common Cordgrass is also present. There are also zones dominated by Creeping Bentgrass and Red Fescue. Some parts of the ASM have an unusual species assemblage dominated by Sea Arrowgrass or Sea Aster and also containing frequent bare mud, and seem to be in transition back to typical ASM communities. Other species present include Annual Sea-blite, Lax-flowered Sea Lavender and Sea Milkwort. Sea Purslane is present but rare.

Inner Estuary (northern side)

There is a large ASM area on the eastern side enclosed by a berm that is grazed by horses (owned by Birdwatch Ireland). The berm is in poorer condition compared to those on the southern side and there are several large breaches. Some of the berm is eroding badly. The ASM vegetation in this area is somewhat disturbed or has an unusual species assemblage and this is probably related to old reclamation works and more recent disturbance from horses. Some large sections are in poor condition. This area has a low sward height and shows some disturbance with frequent bare mud amongst the ASM vegetation being colonised by Glasswort and Annual Sea-blite. There is some light poaching. There are several zones present within this area behind the berm. The north-west section is slightly raised and is dominated by Red Fescue with frequent Sea Plantain and Saltmarsh Rush along with frequent Glasswort. It also contains low mounds with transitional species such as Autumn Hawkbit (*Leontodon autumnalis*), Curled Dock and Spear-leaved Orache (*Atriplex prostrata*). A large

deep drain divides this area into two sections and some of the drain has been infilled. There is also a large deep drain and associated berm along the northern boundary of this area. There are few pans or creeks in this area. Creek formation is best in the lower section close to the berm. The south-east and eastern sections contains more frequent lower zone species with Common Saltmarsh-grass prominent. There are some areas with abundant Glasswort and occasional Annual Sea-blite and Greater Sea-spurrey that have colonised bare mud, and there are patches that could be classified as 1310 *Salicornia* flats. These areas may have developed in response to grazing and disturbance by horses.

ASM saltmarsh is also present on both sides of the main channel that leads into the northern side of the estuary and west of the new Birdwatch Ireland bird hide. This ASM is dominated by mid-marsh salt marsh communities with a low Sea Pink sward present in hollows and Red Fescue and Saltmarsh Rush-dominated patches on low mounds. There is some zonation of saltmarsh plant communities related to the distance from the main channel. There are steep high saltmarsh cliffs along the edge of the channel. This area has some pans present and some minor channels connecting to the main channel. Common Cordgrass is present but is not prominent. Further north, patches of transitional upper marsh vegetation have developed with Twitch dominating large sections and Sea Club-rush (*Bolboschoenus maritimus*) occupying some of the creeks or drainage channels. Hard Grass (*Parapholis strigosa*) is present along the bank leading to the bird hide. There are still some patches of ASM vegetation present in hollows but these are less prominent compared to the Twitch-dominated areas. Upper ASM vegetation is dominated by Red Fescue and Creeping Bentgrass with occasionally frequent White Clover (*Trifolium repens*) and occasional Autumn Hawkbit, Sea Aster, Sea Arrowgrass, Sea Milkwort and Sea Plantain.

The saltmarsh at the western side of the main channel contains more frequent Common Cordgrass. This species is scattered through the ASM in small dense patches and is also dominant in those larger areas mapped as *Spartina* swards with some ASM on the established saltmarsh. Sea Purslane and Common Saltmarsh-grass dominate along a narrow zone at the seaward edge of the established saltmarsh and also along the edges of the some of the larger creeks. Both mid-marsh and upper marsh zones are present. There are unusually abrupt boundaries between these zones that are related to the edges of low flat plateaus that are vegetated by a grassy upper

saltmarsh plant community. These low green plateaus are visible on the OSI 2000 series aerial photo. A low-mid saltmarsh community dominated by Lax-flowered Sea Lavender is also present.

ASM saltmarsh is also present behind a berm at the western end of the northern side of the inner estuary. A drainage channel is situated 10-15 m from along the inner edge of the berm and this drain floods this area. The ASM contains several saltmarsh communities with a lower marsh community dominated by Common Saltmarsh-grass, Sea Arrowgrass and Sea Plantain present and upper marsh vegetation dominated by Creeping Bentgrass and Red Fescue on raised mounds present. This ASM transitions into Twitch-dominated grassland.

Outer estuary

ASM has developed along a narrow strip at the north-western corner of the outer estuary. This ASM transitions to shingle/pebbles along the lower boundary and there is a band of Twitch-dominated vegetation and Sea Beet along the upper boundary before hedgerows develop. The ASM is made up with a strip of Sea Purslane with frequent Sea Arrowgrass and Sea Plantain. The ASM is dominated by a band of Saltmarsh Rush further east and is about 10 m wide in places. There is very little structure with no salt pans present. Other species include Creeping Bentgrass, Orache (*Atriplex* sp.) and Sea Milkwort.

ASM saltmarsh is also present in an enclosure at Whitestown, which is located in the north-east corner of the outer estuary. A minor road on an embankment is situated along the seaward side of this area. This enclosure contains a large channel that drains this section and allows the tide to flood the area at times. This area is not grazed at present. The vegetation along the channels is characterised by Red Fescue and Creeping Bentgrass-dominated vegetation. Species such as Saltmarsh Rush, Sea Aster and Sea Arrowgrass are prominent. There are few signs of saltmarsh topography with several salt pans present. This area has been modified in the past with signs of drainage and there was probably a sluice at the end of the channel to limit the flow of seawater into this area. Spoil heaps are situated along a large drain at the western side. This area is probably more brackish compared to other saltmarsh and there are transitional species such as Curled Dock present.

The eastern side of the outer estuary is dominated by a shingle or pebble bank. There are occasional small patches of Annual Sea-blite developing amongst the shingle, but these were not classified as saltmarsh vegetation as the substrate was not mud or sand. Towards the southern end small relic patches of mud appear over the shingle/pebble substrate. These patches of mud mainly contain Sea Purslane.

ASM vegetation begins to develop again towards the south-eastern corner of the outer estuary. Initially there is a narrow band dominated by Sea Purslane and there are occasional clumps of Common Cordgrass scattered along the seaward side on stony mud. Further south into the corner the clumps of Common Cordgrass amalgamate to form *Spartina* swards. There is a unique transition zone on a gradual slope between the ASM and the *Spartina* swards, rather than the boundary being marked by a saltmarsh cliff. Species such as Sea Purslane, Common Saltmarsh-grass and Lax-flowered Sea Lavender become less common and Common Cordgrass begins to dominate down the slope. The ASM becomes characterised by a narrow strip dominated by Saltmarsh Rush and Sea Rush (*Juncus maritimus*) is also present.

The ASM saltmarsh in the south-eastern corner is divided into two sections by a main channel that flows through the centre. There is a wall marking the landward boundary of the saltmarsh adjacent to a minor road along the shoreline. The southern saltmarsh is characterised by a large patch of established saltmarsh dominated by Common Cordgrass (and mapped as *Spartina* swards with some ASM). Much of this section contains a mosaic of lower marsh ASM and *Spartina* sward. There are frequent small dense patches of Common Cordgrass where it has colonised old pans. There are patches of mid marsh vegetation dominated by Sea Pink and Sea Plantain at the landward side.

A narrow band of ASM is present along the southern side of the outer estuary. This strip of saltmarsh varies in width but is generally about 5 m in width. There are sections with very little zonation and the ASM strip is dominated by a band of Saltmarsh Rush with occasional clumps of Sea Rush along the seaward cliff, adjacent to the *Spartina* sward. Some sections have occasionally frequent Sea Rush. (These have not been mapped as 1410 as they are quite small and the bands of Sea Rush is generally quite narrow being 1 m or less.) A band of Creeping Bentgrass occurs at the landward side of the Rush-dominated strip. Species such as Silverweed (*Potentilla anserina*), Spear-leaved Orache and Sea Beet occur on some low mounds

raised slightly above the high water mark. Further west, Sea Purslane becomes more prominent along the seaward edge and there are signs of erosion. There is no *Spartina* sward along the ASM in this area. In the south-western corner the ASM widens somewhat and there are several zones present. A patch of Sea Club-rush occurs at the landward side of this ASM.

Portrane

This area of ASM saltmarsh is protected by some embryonic dunes along the edges of sand dunes. There is some zonation of saltmarsh communities with upper saltmarsh communities at the southern end. The southern section is quite flat and uniform with few pans. There are indicators of wind erosion and bare ground reaches 5-10% in some patches. This area is dominated by Red Fescue with frequent Sea Plantain and Long-bracted Sedge (*Carex extensa*) was present. There are small amounts of Sea Pink, Sea Purslane and Sea Milkwort. This saltmarsh is notable for the presence of Rock Sea-Lavender (*Limonium binervosum*). The sward is quite short and uniform.

Sand is encroaching from a blow-out in the dunes along the eastern side. There has been some dune repair works by Fingal County Council in this area. The sand is blowing over the saltmarsh and is being colonised by Sea Couch (*Elytrigia pycnanthus*) and Lyme Grass (*Leymus arenarius*). Saltmarsh vegetation in this area is characterised by the dominance of Common Saltmarsh-grass and this is probably related to the disturbed nature of this area.

Pans become more prominent towards the northern end and one large creek drains the saltmarsh. There are very small patches of Glasswort and Annual Sea-blite on mud within the creek beds. The northern saltmarsh section contains frequent Common Saltmarsh-grass along with Sea Aster, Lax-flowered Sea Lavender, Glasswort and Sea Purslane. A track occurs along the landward edge of the saltmarsh that is used by walkers and vehicles. Common Cordgrass is quite rare in this saltmarsh and appears in some creeks towards the northern end.

There has been some recent deposition of sand and shingle at the northern end of the saltmarsh and some development of embryonic dune since the CMP survey in 2004. A ridge dominated by Sea Purslane is present along part of the front of the saltmarsh, protecting the front of the saltmarsh somewhat. The saltmarsh transitions to sandy mud further seaward.

Further eastward around the tip of Portane Burrow there are several strips of ASM vegetation. This ASM saltmarsh is characterised by a band of Sea Purslane along the seaward edge. There is a small platform of eroded mud along the edge where the established saltmarsh is eroding back. Behind this band there is a zone dominated by Sea Plantain, Sea Arrowgrass, Lax-flowered Sea Lavender and Common Saltmarsh-grass.

Mediterranean salt meadows (H1410)

This habitat mainly occurs within the southern side of the inner estuary although there is a small patch on the northern side and a small patch in the south-western corner of the outer estuary. It is generally situated along the landward side of the saltmarsh and along the landward boundary, with ASM vegetation to the seaward side. The eastern side of this habitat is quite narrow (east of the bird hide). There is a dense band of Sea Rush along the lower boundary adjacent to the ASM. Further landward the Sea Rush breaks up somewhat and there are scattered clumps of Sea Rush amongst ASM vegetation. Occasionally there are patches of middle marsh vegetation dominated by Sea Plantain and Sea Pink within the MSM.

The largest area of MSM occurs west of the bird hide. There is an abrupt boundary between the MSM and the ASM. The MSM generally occurs on slightly raised areas (about 0.3 m above the ASM) and there is a slight bank along the boundary. This is an unusual feature and may indicate old reclamation works or may also indicate several stages of saltmarsh accretion. These raised plateaus are characterised by the presence of clumps of Sea Rush. However, the Sea Rush generally does not dominate. There is generally abundant Red Fescue and frequent Sea Plantain, with smaller amounts of Saltmarsh Rush, Creeping Bentgrass, Sea Arrowgrass, Common Scurvygrass and Autumn Hawkbit. There are occasional slightly raised mounds that contain Twitch. There are lower strips or channels between the plateaus that contain ASM vegetation. The MSM transitions to dry earthen berms or banks at the landward side.

***Spartina* swards**

This habitat can be divided into two categories, *Spartina* sward that has developed on open mudflats and *Spartina* sward that has developed on established saltmarsh.

There are several large patches of *Spartina* swards that have developed on mudflats, particularly adjacent to Ballealy Landfill and in the south-eastern corner of the outer estuary. In both of these areas the *Spartina* swards are characterised by dense swards or large clumps of Common Cordgrass on very soft mud. Common Saltmarsh-grass, Lax-flowered Sea Lavender, Greater Sea-spurrey and Glasswort are all occasionally frequent at the landward side of the *Spartina* sward. There is generally few other saltmarsh species present although Lax-flowered Sea Lavender, Common Saltmarsh-grass and Greater Sea-spurrey may appear quite far out in the sward. The *Spartina* swards are generally broken up by an intricate network of creeks, particularly in the area adjacent to Ballealy Landfill. In this area there are also some enclosed patches of bare mud within the sward. There are few signs of seedlings at the seaward side of the main *Spartina* sward.

The area in the south-eastern corner of the outer estuary is characterised by more scattered aggregates of large clumps that have not coalesced as significantly to form dense swards. Further seaward the clumps become much less frequent. There is an unusual natural transition from the ASM to *Spartina* sward along a gradual slope in this corner of the estuary. There seems to be some recent growth of Common Cordgrass along the seaward side of an old saltmarsh cliff (on the south side) that originally marked the edge of the *Spartina* sward. There are patches of *Salicornia* flats to the seaward side of the *Spartina* sward. Further west Glasswort appears within the *Spartina* sward in small patches. The sward develops into a narrow band of dense Common Cordgrass adjacent to the shoreline. There are occasional isolated clumps of Common Cordgrass further seaward on the mudflats. There are no indications of any Common Cordgrass seedlings along this zone. The extent of Common Cordgrass continues west but then the sward breaks up and there are no clumps of Common Cordgrass on the mudflats adjacent to the ASM in the south-western corner of the outer estuary.

There is patchy *Spartina* sward formation at the north-west corner of the outer estuary. This sward has colonised pebbly mud. There are several isolated clumps of Common Cordgrass in a zone about 100 m out from the seaward side of the established sward. Some boulders have been left along the landward side of the *Spartina* sward. There is very little ASM development along the landward side of the *Spartina* sward and this habitat abruptly stops at or near the edge of the mudflats.

There are also significant amounts of Common Cordgrass on established saltmarsh. It was sometimes difficult to map the ASM and the *Spartina* swards as there was quite variable cover of Common Cordgrass on the established saltmarsh and it occurred in a mosaic with the ASM. *Spartina* swards were mapped on established saltmarsh where the overall cover was greater than 40%, although the cover within these areas varied considerably (mainly between 20-75%) and there were sometimes small patches of ASM with no Common Cordgrass.

Common Cordgrass has infilled some small inlets along the ASM that originally contained mudflats along the southern side of the inner estuary. These inlets were marked on the 2nd edition OSI 6 inch map. There were some signs of die back of Common Cordgrass at the seaward side of the sward on mudflats. These lower-lying areas contain dense mono-specific swards of common Cordgrass. There are also significant areas dominated by Common Cordgrass within the established saltmarsh generally have significant amounts of Sea Purslane and Common Saltmarsh-grass, along with occasional Sea Lavender and Greater Sea-spurrey. The cover of Common Cordgrass varies between 20-70%. These have been mapped as *Spartina* swards with some ASM. There are also occasional relic patches of ASM dominated by Sea Pink and Sea Plantain within the *Spartina* sward.

Further west of the bird hide along the southern side of the inner estuary the saltmarsh cliff is quite high (1 m) and remains high where the river channel narrows. The saltmarsh cliff occurs adjacent to relatively steep intertidal mudflats that slope down to a central channel, and there is no Common Cordgrass seaward of the cliff. There is a narrow band of ASM vegetation along the saltmarsh cliff and to the seaward side of *Spartina* sward. This band may be slightly raised compared to the level of the *Spartina* sward.

Spartina swards also occur on established saltmarsh on the western side of the northern side of the inner estuary. This plant community is dominated by Common Cordgrass. However, there are only a few small patches with cover > 75%. Generally the cover of Common Cordgrass is between 20-60%. Other species present include Sea Purslane, Common Saltmarsh-grass, Greater Sea-spurrey, Sea Arrowgrass, Sea Plantain and Lax-flowered Sea Lavender. There are small patches of mid marsh ASM dominated by Sea Pink and Sea Plantain within these areas mapped as *Spartina* swards. ASM generally occurs as a narrow band along the seaward

boundary of the established saltmarsh and follows the edges of the large creeks that protrude into this part of the saltmarsh.

IMPACTS AND ACTIVITIES

This site has a range of varied activities, which is typical of a large site with several habitats that are quite spread out over a wide area with a range of different management units and activities (Table 4.1). The saltmarsh habitats have been disturbed in the past by activities associated with reclamation, the construction of the railway viaduct and Ballealy Landfill. These impacts are still having some residual impacts but have not been assessed as the activities occurred prior to 1993.

Table 4.1. Intensity of various activities on saltmarsh habitats at Rogerstown Estuary.

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
1310	954	B	-1		Inside
1330	140	B	-1	10.4	Inside
1330	501	C	-1	1.71	Inside
1330	622	C	-1	1.71	Inside
1330	623	C	-1	0.5	Inside
1330	900	C	-1	0.01	Inside
1330	954	B	-1	3.8	Inside
1330	990	C	-1	0.5	Inside
13s	100	C	0	all	Outside
13s	120	C	0	all	Outside
13s	140	C	0	all	Outside
13s	502	C	0	all	Outside
13s	601	C	0	all	Outside
13s	701	C	0	all	Outside
13s	990	C	-1	0.75	Outside

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

The saltmarsh at Portrane is affected by some impacts and activities related to amenity use (the activity codes use in Table 4.1 are given in parentheses in the following text). Cars park on the flat saltmarsh to access Portrane Strand (623). There are also wheel ruts in places over the saltmarsh (623). A sandy track is situated along the western side of the saltmarsh that accesses the northern shoreline (501). There has been a recent blow-out in the dunes along the eastern side and sand is

encroaching onto the saltmarsh. There is some natural transition from saltmarsh to embryonic dunes (990). Fingal County Council are attempting to restore the dunes in this section. There are frequent wheel ruts on the saltmarsh related to these restoration works. Tracks on the saltmarsh (and sand dunes) are used by walkers, dog walkers and horse riders (622).

There are occasional deep channelised creeks that cross the saltmarsh and drain the adjacent land (810). Examples of these can be seen adjacent to Beaverstown Golf Course (southern side of the inner estuary). These have probably not been modified in the current assessment period and therefore are not assessed. There are still probably residual impacts from these drains. There are still signs of spoil heaps or ridges along these channels and they may be vulnerable to cleaning or deepening in the future.

Most of the saltmarsh is ungrazed by livestock and has a relatively high sward height, particularly in grassy mid-upper marsh areas (140). Hares and waterfowl do graze on the saltmarsh and the mid marsh zone has a typical natural low sward height. An area behind a berm along the northern side of the inner estuary has been grazed by horses at times. These horses may be encroaching into this area (owned by Birdwatch Ireland) from adjacent land and their presence is generally unwanted by Birdwatch Ireland. The horses have poached the ground in this section and there are signs of disturbance in the vegetation with Glasswort frequently occurring.

The inner estuary is notable for the large areas of Twitch-dominated grassland adjacent to the Annex I ASM. The Twitch dominated areas can be classified as upper saltmarsh (CM2) but are not classified as ASM because this community does not fit into the Glauco-Puccinellietalia maritimae (Rodwell 2000). These areas sometimes contain small brackish hollows or old creeks and pans that contain more typical ASM vegetation. Fingal County Council owns many of these fields along the southern side of the inner estuary. However, they are not managed at present. Some grazing may be beneficial in these areas in increase plant diversity in the Twitch-dominated stands (149). Meadow Barley (*Hordeum secalinum*), a plant listed in the Flora Protection order, is present within Rogerstown Estuary SAC and has been recorded in some of these brackish hollows, particularly in Newhaggard along the north side of the inner estuary.

The berms that enclose land along the inner estuary are indicators that saltmarsh was reclaimed in the past (802). Many of these berms have fallen into various states of disrepair and have been breached or are eroding. Some of the berms may have been breached deliberately. This is leading to the re-establishment of ASM saltmarsh in some of the land inside these berms. This ASM has an unusual species assemblage in places and this is an indicator of the habitat in transition. There are further possibilities for managed retreat and the restoration of saltmarsh in the inner estuary, particularly on the land owned by Fingal County Council. The frequent drains and banks that mark the landward boundaries are also indicators of the previous history of reclamation.

Birdwatch Ireland own 45 ha of land along the northern side of the inner estuary. This land is managed positively for the wintering waders and wildfowl that use the estuary. Birdwatch Ireland has constructed a bird hide on this reserve. Birdwatch Ireland has a management agreement with land owners to the west of this area to also manage the land sensitively for the use of waders and wildfowl. There has been some drainage works to control water levels on sections of the saltmarsh for the benefit of the waterfowl. There was a small area being tilled inside the berm at the western end of the northern side of the inner estuary that is situated within the area that is in the management agreement.

Many of the older published and unpublished sources on Rogerstown Estuary mention the impact of Ballealy Landfill on the estuary. Pollution from heavy metals and eutrophication has been noted as affecting the mudflats (Fahy *et al.* 1975) (701). Water quality within the estuary has been monitored regularly by Fingal County Council. More recent studies have indicated that leachate from the dump has moderated somewhat (MPSU Conservation Plan). There were no signs of pollution affecting the saltmarsh vegetation.

Common Cordgrass is a prominent part of the saltmarsh at Rogerstown Estuary. This is an invasive species (954). This species has formed swards on both the intertidal mudflats and also forms mosaics with ASM vegetation on the established saltmarsh. The area mapped as *Spartina* swards with some ASM on established saltmarsh is 3.8 ha. Common Cordgrass was first recorded from the estuary in 1938 (Praeger, 1939), although in 1957 it was noted "that nowhere in the Estuary does *Spartina* occur" by O'Reilly and Pantin, (1957). However, by the 1970s it had become well established

(Fahy *et al*., 1975). In more recent years some natural dieback has been recorded (Madden cited in McManus *et al*., 1992). Common Cordgrass has been present at this site since the 1960s and Nairn (1986) noted that it had increased significantly in extent during this period.

A comparison of the aerial photos from 1995 and 2000 indicates that Common Cordgrass has not spread significantly on mudflats in either the area adjacent to Ballealy Landfill or the area in the south-eastern corner of the inner estuary. Both these swards show up well on the aerial photos. Since then there does not seem to have been any significant growth or reduction of the extent of *Spartina* swards on mudflats. There were no signs of new seedlings present and many of the clumps are quite large and relatively old. Signs of old die-back were noted on both sides of the inner estuary although the extent of die-back was not significant. A reduction in the extent of *Spartina* sward may have occurred in the north-eastern corner of the outer estuary. Both these swards have developed in areas that formerly contained significant stands of *Salicornia* flats, as indicated by O'Reilly and Pantin (1957).

It is difficult to interpret the extent of Common Cordgrass on the established saltmarsh from the aerial photos. There were no indications that it has spread significantly in the recent past. The spread of Common Cordgrass since the 1950s has been most significant in the lower marsh zones and it is likely to have transformed large areas formerly dominated by Common Saltmarsh-grass and Lax-flowered Sea Lavender into areas dominated by Common Cordgrass.

A comparison of the 1920's OSI 2nd edition six inch map to the current extent of saltmarsh shows there has been several gains and losses of saltmarsh around the estuary. Some of these gains and losses may be related to adjustments after infilling of mudflats by the Ballealy Landfill. The landfill covered some established saltmarsh in the north-west corner of the inner estuary. There are minor changes to the boundaries of the saltmarsh in the western part of the inner estuary although there are indications of erosion (900) along both sides of the channel where it is narrower, where the saltmarsh is undercut, and accretion is occurring on the opposite side. The western side of the berm around Newhaggard has also been eroded. The boundary of the saltmarsh along the southern side of the inner estuary shows some losses and gains. There has been some natural erosion of saltmarsh along the eastern side of the

outer estuary since the survey carried out by O'Reilly and Pantin (1957). Saltmarsh (and sand dunes) at Portrane Burrow were also previously much more extensive.

CONSERVATION STATUS

Overall Conservation Status

The overall conservation status of the site is *unfavourable-inadequate* (Table 5.1). The saltmarsh in the inner estuary has been affected by reclamation in the past and these activities are probably still having a residual impact. However, the saltmarsh is slowly recovering from this disturbance. Part of the saltmarsh is affected by amenity pressure but this only affects a small area. *Spartina* swards are extensive around the site and are mainly confined to the mudflats and the lower zones of the established saltmarsh. The impacts of Common Cordgrass on the mudflats and Eelgrass communities are not considered with this assessment. *Spartina* swards are likely to have replaced *Salicornia* flats in the past but this occurred prior to the current assessment period and therefore is not assessed. The conservation value of this site is enhanced by the presence of extensive brackish areas dominated by Twitch at the landward side of the ASM.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Rogerstown Estuary.

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

Salicornia and other annuals colonizing mud and sand (H1310)

Extent

The extent of this habitat (2.6 ha) is assessed as *favourable* in the absence of any accurate information on the previous extent of this habitat. There are no indications that the extent of *Salicornia* flats has increased or decreased significantly in the current assessment period.

The spread of Common Cordgrass has probably negatively affected the extent of this habitat but as most of the *Spartina* sward established prior to 1995 it is not considered during this assessment. A comparison of the current extent of *Salicornia* flats to the previous extent as mapped by O'Reilly and Pantin (1957) indicates that there has been a significant reduction of extent due to the spread of Common Cordgrass on mudflats. This is especially significant in the south-east corner of the outer estuary and along the southern edge of the outer estuary and in an area adjacent to the Ballealy Landfill. Some patches of *Salicornia* flats are still present in this area. However, O'Reilly and Pantin (1957) did indicate that the strip of *Salicornia* flats stretched to the south-west corner of the outer estuary. No *Salicornia* flats were recorded in this area but Common Cordgrass is not present on the mudflats in this area. O'Reilly and Pantin (1957) also indicated that *Salicornia* flats were present in the north-western corner of the outer estuary. This area now contains scattered clumps of common Cordgrass and no patches of *Salicornia* flats were present in this area.

A small area of *Salicornia* flats in the north-east corner of the inner estuary has been covered by Ballealy landfill.

Habitat structure and functions

The habitat structure and function of this habitat is assessed as *favourable*. Four monitoring stops were carried out in this habitat and all passed. The largest patches of this habitat were situated in the south-eastern corner of the outer estuary. Small clumps of Common Cordgrass and some Fuciods are the only other species present within these patches. However, the overall cover of Common Cordgrass within the habitat is less than 1%. There are no other major activities or impacts on these patches. All the other patches are typically long narrow strips situated along the edge of the ASM and usually contain occasional Annual Sea-blite, Common Saltmarsh-grass, Greater Sea-spurrey and Lax-flowered Sea Lavender. There was generally no

transitional zone between the ASM and the *Salicornia* flats as an abrupt boundary between the two habitats was indicated by the saltmarsh cliff. This may be due to the lack of actively accreting zones along the edge of the saltmarsh and the presence of Common Cordgrass in these zones.

Salicornia dolichostachya is the main species which occurs on the open mudflats, notably at the extreme south east and north west corners of the outer estuary but also in the inner estuary (west of the railway line). Doogue *et al.*, in The Flora of Co. Dublin (1998), note the presence of *S. ramosissima* and *S. europaea* on the muds at Raheen Point. No classification could be made of individual Glasswort species could be made during the current survey due to its timing in early summer when Glasswort is poorly developed.

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 continue in the near future. This habitat is vulnerable to the invasion of Common Cordgrass. Whilst the cover of Common Cordgrass is low within this habitat, there are frequent clumps occurring around the habitat, especially on the mudflats in the south-eastern corner of the outer estuary. The spread of Common Cordgrass in the 1970's significantly lowered the extent of *Salicornia* flats in Rogerstown Estuary. It is difficult to predict with accuracy if Common Cordgrass will continue to spread in Rogerstown Estuary.

There are no other activities or impacts affecting this habitat. This habitat is prone to natural changes in distribution and extent in response to erosion and accretion of sediment banks within creeks and along the seaward saltmarsh cliffs.

Atlantic salt meadows (H1330)

Extent

The extent of this habitat is assessed as *favourable*. There are no indications that there has been any significant loss of extent during the assessment period. There have been some natural losses of saltmarsh, as there is a transition to embryonic sand dune at Portrane Burrow. The spread of sand onto the saltmarsh was also noted by O'Reilly and Pantin (1957). This is an indication of a natural dynamic system changing as the position of the edge of the Burrow and the sand dunes changes.

There are no indications that Common Cordgrass has spread significantly on the established saltmarsh during the current assessment period. There are also no indications that there has been any significant erosion of saltmarsh during the current assessment period.

There has been some natural erosion of a narrow saltmarsh strip along the north-eastern side of the outer estuary. Common Cordgrass has also spread significantly into the established saltmarsh and *Spartina* swards occupy about 10% of the established saltmarsh that was probably formerly ASM. As this has largely occurred prior to the current assessment period it is not assessed. An examination of the survey map produced by O'Reilly and Pantin (1957) indicates that the saltmarsh at Portrane Burrow is probably reducing in size due to natural erosion (of the sand dunes). The sand dunes are moving westwards over the saltmarsh.

The saltmarsh located at Whitestown is not marked on O'Reilly and Pantin (1957) survey. This is a more brackish area than typical ASM and may have not been regarded as ASM during their survey.

Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Twenty-eight monitoring stops were carried out in this habitat and twenty-three passed (82%). Several saltmarsh plant communities are present including lower, mid and upper zones depending on elevation. The ASM has a typical species diversity. The sward height is quite diverse even though the grazing intensity overall is low. The mid zone has a typical very low sward height while the lower and upper zones have a more varied height due the presence of grasses and Sea Purslane.

A comparison of the current state of the saltmarsh to the description in O'Reilly and Pantin (1957) indicates that most of the ASM has not changed significantly. The greatest change in the structure and functions has been the spread of Common Cordgrass into established saltmarsh. The saltmarsh at Portrane Burrow and around the northern edge is similar to the description given in O'Reilly and Pantin (1957).

Common Cordgrass is present in the ASM. It is widely distributed over most of the ASM but it generally occurs at low cover values (< 5%). It is more frequent in the areas mapped as *Spartina* swards with some ASM. These areas contain a mosaic of Common Cordgrass and ASM vegetation but overall Common Cordgrass is dominant.

There are several failed monitoring stops in some of these areas due to the high cover of Common Cordgrass.

The saltmarsh topography is well developed in most of the larger sections of the ASM and there is a very complex creek and salt pan structure, particularly in the area adjacent to Beaverstown Golf Club and the area in the BirdWatch Ireland Reserve along the northern creek. These creeks are functioning adequately. There has been some disturbance of the drainage of the saltmarsh with several drains crossing the saltmarsh from adjacent land. These drains were dug some time ago and are therefore not assessed.

The ASM also contains some areas that were reclaimed in the past. These areas were enclosed from the sea by large berms. However, the reclamation was unsuccessful and some of this land is reverting back to ASM saltmarsh. The large area in the northern side of the inner estuary shows some recent disturbance with poaching by horses. There are sections of this area that contain pioneer saltmarsh vegetation and this could indicate that the intensity of the disturbance was greater in the past, but that these areas are now attempting to recover. There were several failed monitoring stops in this area. Sections of ASM behind berms along the southern side of the estuary contain unusual species assemblages that probably indicate the land is transitioning back to saltmarsh.

The conservation value of this saltmarsh is enhanced by the presence of Rock Sea Lavender (*Limonium binervosum*). This species is present in the sandier parts of the mid marsh zone and is associated with patches of bare substrate.

Future prospects

The future prospects of this habitat is assessed as *favourable*. This assessment assumes that the current management activities and level of impacts continue in the near future. There are few significant impacts or activities on this habitat. Most of the saltmarsh in the outer estuary is located within the Nature Reserve. Some of the inner estuary is also been managed to benefit wintering waders and wildfowl within the Birdwatch Ireland Nature Reserve and the area under active management agreement. The spread of Common Cordgrass on the established saltmarsh can be considered as a negative factor but it is not likely to increase significantly in the future as it is already present in much of the lower saltmarsh zone. It is not likely to spread

significantly into the mid-marsh zones. Most of the saltmarsh is not being grazed by livestock so grazing is not significant. The area damaged by grazing is under the control of Birdwatch Ireland and they have indicated that the encroachment of horses into this area from adjacent land is unwelcome. There are no indications of any major erosion of the saltmarsh. ASM at Portrane Burrow is being affected by amenity use but the intensity is quite low.

Mediterranean salt meadows (H1410)

Extent

The extent of this habitat is assessed as *favourable*. This habitat is mainly located along the southern side of the inner estuary with small patches at other locations. There is no information to indicate that the extent of this habitat has increased or reduced in the current assessment period. A comparison of the O'Reilly and Pantin (1957) survey to the current situation indicates that Sea Rush dominated areas were present in the areas that they were recorded during the current survey. Some of the descriptions of the narrow strip of saltmarsh located along the southern side of the outer estuary indicate that the abundance of Sea Rush may have decreased somewhat since the 1950's.

Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. Five monitoring stops were carried out in this habitat and they all passed. This habitat has a typical species diversity and its presence increases the sward height diversity of the overall saltmarsh habitat. It also displays some zonation. Upper saltmarsh zone species such as Red Fescue, Saltmarsh Rush and Creeping Bentgrass are frequent. One notable feature of this habitat is that Sea Rush cover in this habitat is lower compared to some sites and there are significant amounts of other ASM species within this habitat. The largest section of this habitat located along the southern side of the inner estuary is situated on flat raised plateaus and there is an abrupt transition to the ASM. The western side of this habitat contains an area with frequent low mounds containing Twitch-dominated grassland. The height variation between the MSM and the ASM may be related to various different stages of saltmarsh accretion or reclamation. An examination of the 1st edition 6 inch map (1840s) indicates that

these MSM areas were not mapped as part of the saltmarsh but were mapped similar to the adjacent land, indicating they may have been reclaimed in the past.

There are occasional salt pans present within this habitat. Creeks generally do not reach this high up the saltmarsh but there are several channelised drains from adjacent land that pass through this habitat. There are few other impacts on this habitat.

Future prospects

The future prospects of this habitat is assessed as *favourable*. This assessment assumes that the current management activities and level of impacts continue in the near future. There are no major impacts or activities affecting this habitat. This habitat is not vulnerable to the further spread of Common Cordgrass, as it generally occurs at elevations where Common Cordgrass is un-competitive.

MANAGEMENT RECOMMENDATIONS

Some grazing may be beneficial in the Twitch-dominated areas along the inner estuary to increase plant diversity in these areas. There are possibilities for managed retreat in these areas behind the berms by increasing the influence of the tide by breaching the berms and restoring creek function. Fingal County Council owns many of these fields along the southern side of the inner estuary. However, they are not managed at present.

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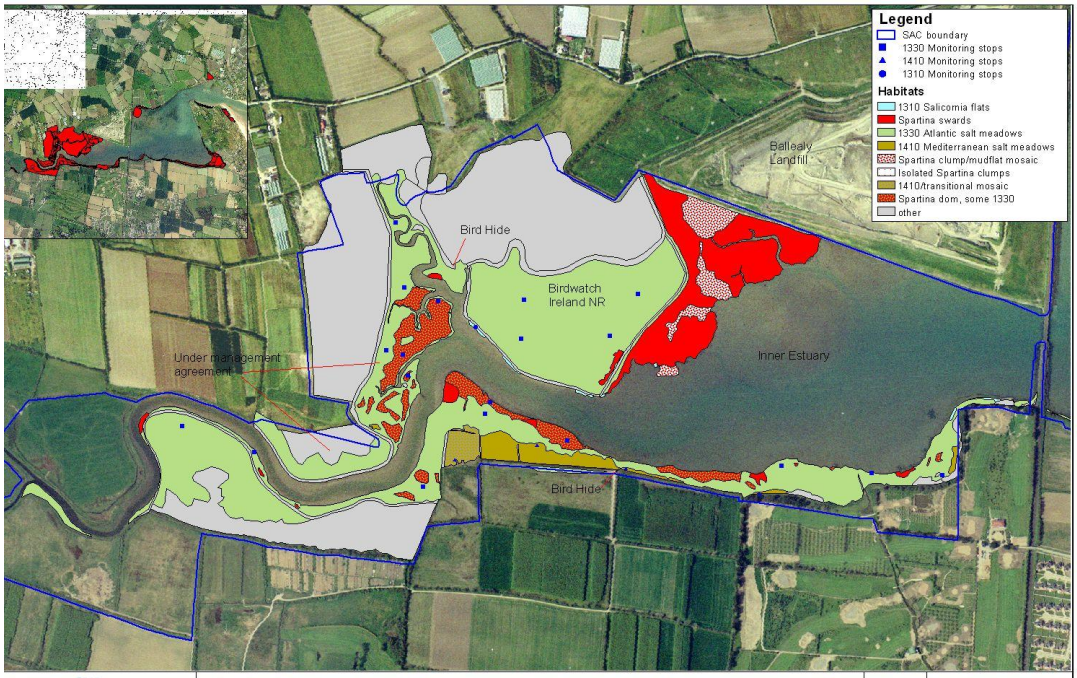
Legend
SAC boundary
1330 Monitoring stops
1410 Monitoring stops
1310 Monitoring stops
Habitats
1310 Salicornia flats
Spartina swards
1330 Atlantic salt meadows
1410 Mediterranean salt meadows
Spartina clump/mudflat mosaic
Isolated Spartina clumps
1410/transitional mosaic
Spartina dom, some 1330
other
Ballealy Landfill
Bird Hide
Birdwatch Ireland NR
Under management agreement
Inner Estuary
Bird Hide
Saltmarsh Monitoring Project
Rogerstown Estuary (inner estuary) (Map 1 of 3)
SMP Code: SMP0001
Map produced by: SMP 2006
Map Version: 1
Rogerstown Estuary cSAC (000208)
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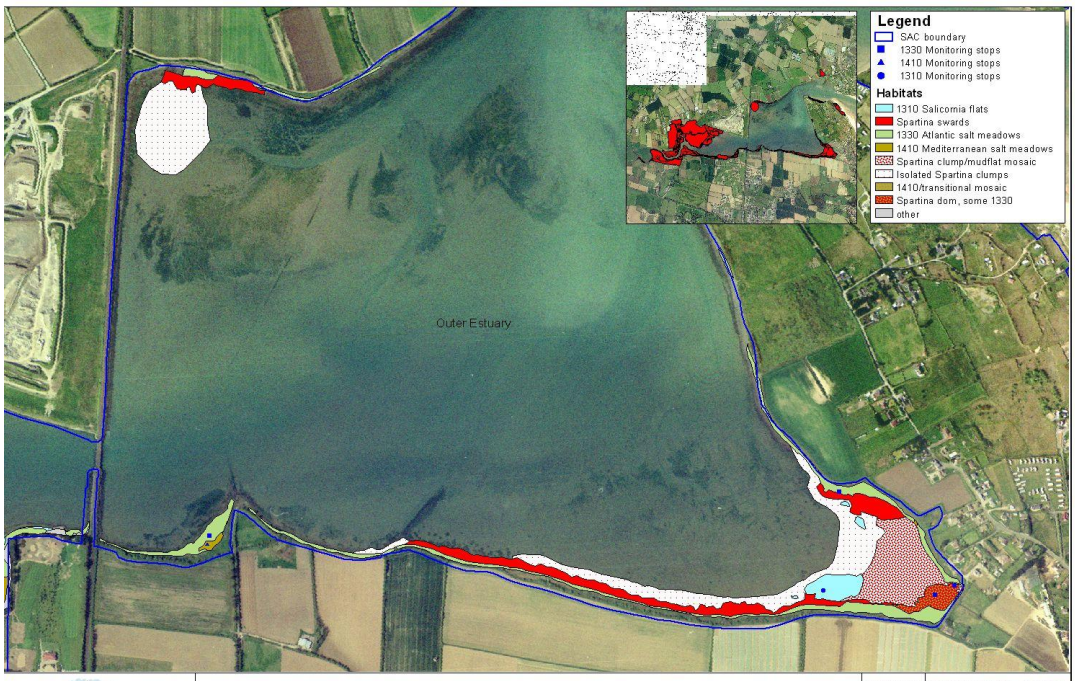
Scale: 1:6323
N


Legend
SAC boundary
1330 Monitoring stops
1410 Monitoring stops
1310 Monitoring stops
Habitats
1310 Salicornia flats
Spartina swards
1330 Atlantic salt meadows
1410 Mediterranean salt meadows
Spartina clump/mudflat mosaic
Isolated Spartina clumps
1410/transitional mosaic
Spartina dom, some 1330
other
Outer Estuary
Saltmarsh Monitoring Project
Rogerstown Estuary (outer) (Map 2 of 3)
SMP Code:
SMP0001
Map produced by: SMP 2006
Map Version: 1
Rogerstown Estuary cSAC (000208)
0 0.2 0.4 Kilometers
Scale: 1:6120
N

Saltmarsh Monitoring Project

Rogerstown Estuary (Rush) (Map 3 of 3)

SMP Code: SMP0001

Map produced by: SMP 2006

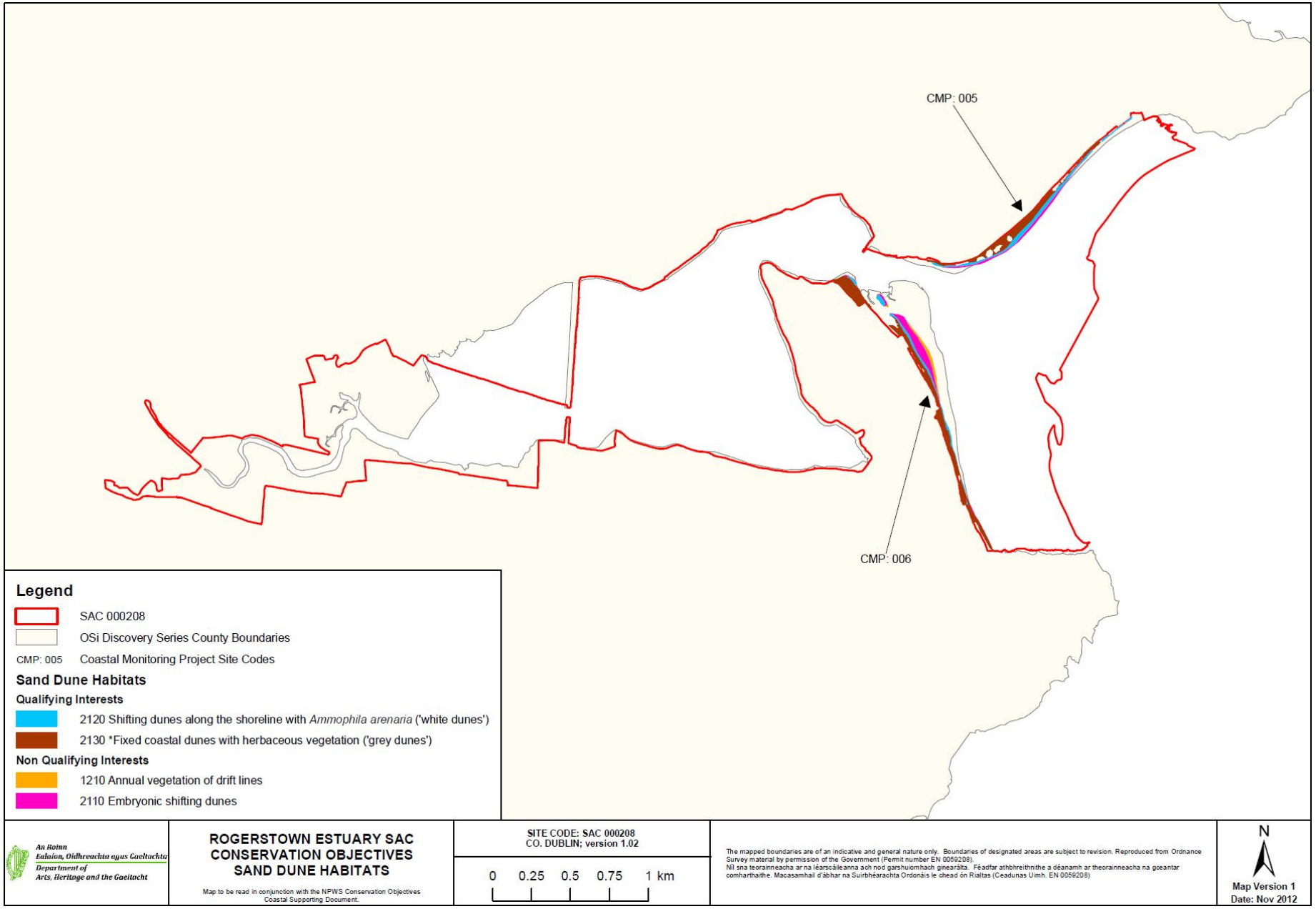
Map Version: 1

Rogerstown Estuary cSAC (000208)

0 0.2 0.4 Kilometers N

Scale: 1:4822

Appendix III – Sand dune habitats distribution map within Rogerstown Estuary SAC



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

SITE DETAILS

CMP04 site name: **Portrane** CMP04 site code: **006** CMP Map No.: **06**

County: **Dublin** Discovery map: **43** Grid Reference: **O 252 525**

6 inch Digital maps: **DU 008**

Aerial photographs (2000 series): **O 2859-A & B & C & D**

NPWS Site Name: **Rogerstown Estuary**

NPWS designation: pNHA: **208** cSAC: **208** SPA: **4015**

Nature Reserve: **Yes** Other: **Corine Biotope Site**
Ramsar Site
Wildfowl Sanctuary

Ranger Area: **North Dublin**

MPSU Plan: **Draft 2 (2000)**

Report Author**: Anne Murray**

SITE DESCRIPTION

Portrane sand dune system is part of Rogertown Estuary cSAC which is located in the north of County Dublin. The cSAC contains two sand dune systems that lie on either side of the mouth of the estuary and these are dealt with as two separate sites in this project – Rush (CMP code 05) and Portrane (CMP code 06). The cSAC is designated for the Annex I sand dune habitats Fixed dunes (priority habitat) and Mobile dunes. Other Annex I habitats listed for the cSAC include Estuaries, Mudflats and sandflats, *Salicornia* mud, Atlantic salt meadows and Mediterranean salt meadows.

The outer estuary is designated as a SPA due to the presence of internationally important numbers of Pale-bellied brent geese (*Branta bernicola hrota*) and nationally important numbers of the Annex I species - Golden Plover (*Pluvialis apricaris*) and Bar-tailed godwit (*Limosa lapponica*). The Annex I species (*Sterna albifrons*) Little Tern occasionally bred on the shingle beach at Portrane. However this area has been lost to erosion and no known nesting has been recorded since 1995.

Four Red Data Book plant species have been recorded from the site including *Orchis morio* (Green-winged orchid), *Viola hirta* (Hairy violet), *Hordeum secalinum* (Meadow Barley) and *Papaver hybridum* (Rough poppy). The latter three species are also listed under the Flora (Protection) Order (1999) and are legally protected. Green-winged orchid (*Orchis morio*) and *Viola hirta* (Hairy violet) have been previously recorded in the fixed dunes at Portrane.

The Portrane sand dune system is located on a sand spit known as the Burrow Peninsula, which partly covers the mouth of the outer section of the Rogerstown Estuary. The narrow band of sand dune edges the eastern and the northern side of the spit. A saltmarsh occurs behind the sand dunes at the northern tip. The dunes fronting the saltmarsh have been breached due to natural erosion of the coastline, which has been compounded by human activities. The saltmarsh area directly behind the breach has been covered with sand due to the breach. The southern end of the spit is bounded by a sea wall beyond which is a rocky headland. Access to Portrane strand is mainly from the southern end where there is car park. The dunes here are heavily altered and eroded with a thin band of highly disturbed fixed dune fronted by *Leymus arenarius* (Lyme Grass). Moving northwards there are accreting dunes in the central section with poor quality fixed dunes. Bracken (*Pteridium aquilinum*) is invading the landward side of the fixed dune. There are also some patches of *Hippophae Rhamnoides* (Sea Buckthorn) invading the fixed dunes in places.

In a study by Kirk McKlure Morton (1998) the historical review of the site indicated that system was generally accreting from the 1970s until the early 1990s. Since the 1990s however the system appears to be eroding with a breach occurring in the northern end of the site. The dune line has retreated to almost the same line that existed in the 1970s. Overall the coastline has remained dynamically stable over the past 30 years. The dunes however are currently suffering localised erosion due to human activity especially in more recent times and this is impeding the natural potential of the system to repair itself after storms. This is very evident at the northern end of the site along the eastern edge of the saltmarsh where the breach has occurred.
The sand dune habitat area at Portrane is 9.5 ha. (Table 6A), this area excludes developments such as houses and caravan parks. The Annex 1 sand habitats recorded

at Portrane during this survey include Fixed Dunes (priority habitat), Mobile dunes, Embryonic dunes and Annual vegetation of driftlines.

Fixed Dune (H2130)

The priority habitat fixed dune comprises 5.712ha of the total sand dune habitat at Portrane (Table 6A). This excludes approximately 40ha of the fixed dunes that have been taken over by houses and caravans parks. The numerous tracks and burning in the fixed dunes indicate high recreational pressure. Some of the typical species recorded include *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Thymus polytrichus* (Wild Thyme) *Hypochoeris radicata* (Cat's-ear), *Ononis repens* (Common restharrow) and *Viola tricolor* (Wild pansy). The rare plant *Orchis Morio* (Green-winged orchid) was also recorded during this survey. The fixed dune contains a lot of *Ammophila arenaria* (Marram grass) due to the absence of grazers. The fixed dune in the southern part of the site has been heavily modified by the presence of buildings and amenity grassland. This area is fronted by *Leymus arenarius* (Lyme Grass).

The negative indicator species recorded in the fixed dune include *Cirsium vulgare* (Spear thistle), *Pteridium aquilinum* (Bracken), *Senecio jacobaea* (Ragwort) and *Rubus fruticosus* (Bramble). Sea buckthorn (*Hippophae rhamnoides*) has been planted at the southern end of the site and is extending into the fixed dune.

Table 6A EU Annex I sand dune habitats mapped in Portrane

EU Code	EU Habitat	Area (ha)
H1210	Annual vegetation of driftlines	0.935
H2110	Embryonic Shifting Dunes	1.672
H2120	Shifting Dunes along the shoreline with *Ammophila arenaria*	1.232
H2130	Fixed Dunes with herbaceous vegetation	5.712
	Total sand dune area excluding developments/modifications	**9.551**
	Total sand dune area including developments/modifications	**49.551***

*Approximately 40ha have been taken over by caravan parks, holiday homes and dwellings

Mobile Dunes (H2120)

The mobile dunes are largely confined to the centre section of the site due to erosion in the north and pressure from human activities in the south. The mobile dune comprises 1.232 ha of the sand dune habitat (Table 6A). The typical species dunes is *Ammophila arenaria* (Marram grass) dominates along with *Leymus arenarius* (Lyme

grass). The negative indicator species *Senecio jacobaea* (Ragwort) is present but it is not common throughout the mobile dune. There are blowouts and many tracks present indicating the intense pressure from recreational activities.

Embryonic Dunes (H2110)

The embryonic dunes are located in the accreting centre section of the site and comprise 1.672 ha in area (Table 6A). The typical species present are *Leymus arenarius* (Lyme grass) and *Elytrigia juncea* (Sand couch) along with other species *Honkenya peploides* (Sea sandwort) and *Salsola kali* (Prickly saltwort). There are no negative indicator species in the embryonic dunes.

Annual Vegetation of Driftlines (H1210)

The strandline is lcoated in front of the embryonic dunes in the centre section of the site and some patches occur along the front of the eroding breach in the north. To the south the beach is cleaned and some of the beach material removed from the driftline had been deposited along the front of the eroding face of the fixed dune. This is now colonised by *Beta vulgaris* subsp. *maritima* (Sea beet) and *Atriplex prostrata* (Spear-leaved orache). The total area of strandline is 0.935ha and that naturally includes a large amount of bare sand. The strandline area contains the typical species; *Salsola kali* (Prickly saltwort), *Honkenya peploides* (Sea sandwort), *Cakile maritima* (Sea rocket), *Atriplex laciniata* (Frosted orache) and *Atriplex prostrata* (Spear-leaved orache).

The strandline, although ephemeral in nature, is an important part of the sand dune system and is the precursor of vegetated sand dunes as sand builds up behind the strandline to allow the formation of embryonic dunes. Therefore, removal of the strandline during mechanical cleaning of areas of the beach front is likely to impact the development of foredunes.

IMPACTS

The main activities impacting on the sand dunes at Portrane are given in Table 6B. The fixed dunes to the south have been eroded (900). The fixed dune habitat has been invaded by *Pteridium aquilinum* (Bracken) on the landward side and in the south by

the non-native species *Hippophae rhamnoides* (Sea buckthorn) (Code 954). Infilling by local residents (Code 871) in the northern part of the site next to the area containing the rare orchid-*Orchis Morio* (Green-winged orchid) has altered the fixed dune.

Caravans and holiday dwellings/houses (Code 608) that are permanently located on the dunes have also modified some of the fixed dune. This area is outside of the designated site. The remaining fixed dune within the site and associated saltmarsh are under severe recreational pressure mainly due activities associated with the holiday dwellings and ease of access to the site locally. Cars drive along a track across the saltmarsh to gain access the dunes and holiday houses (Code 623). Areas of the fixed dunes are mowed in front of the houses to provide extra 'garden' area for residents.

Table 6B Intensity and impact of various activities on sand dune habitats at Portrane

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	[1] Area affected/ha	Location of Activity[5]
H2110	871	D	-1	0.02	Inside
H2130	608	B	-1	3	Outside
H2130	954	C	-1	0.01	Inside
21BB	622	B	-1	5	Inside
21BB	623	B	-1	2	Inside
21BB	720	B	-1	3	Inside
21BB	870	B	-2	6	Outside
21BB	900	A	-2	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 5
[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 cSAC. Outside = activities recorded outside but adjacent to sand dune habitat that are impacting the cSAC

The mobile and embryonic dunes are experiencing natural erosion (Code 900) in the southern and northern part of the site while the centre section is accreting. The shift in the dynamics of the sand dune system is largely a response to natural erosion. However this is compounded by the overuse and trampling (code 720) of the dunes and this is affecting all areas of the mobile and embryonic dunes, including those areas that are accreting.

The presence of the strandline is a positive indication for continued dune development. Although the area of strandline mapped at Portrane is just under 1ha,

the typical species are spread very thinly on the ground and the area probably overestimated. The impacts on the strandline are difficult to determine as it is ephemeral in nature, however mechanical cleaning of the beach is evident and this is known to have a negative impact on the development of strandline habitat.

Portrane Strand is popular during the summer for bathing. Walking, horse riding (Code 622) and birdwatching are also very popular activities throughout the year. Horse riding and vehicle access are prohibited under Fingal County Council bye-laws but locals stated that these bye-laws are ignored at Portrane. Quad biking is also a problem on the dunes (code 623).

The impacts listed for the Rogerstown Estuary cSAC in the NATURA form do not apply specifically to the sand dune habitat. It was therefore not always possible to determine the habitat that an impact was related to and so comparisons with impacts recorded in this survey and the NATURA survey were not possible.

CONSERVATION STATUS

The conservation status of a site is assessed on the condition of the site and on baseline information. The main sources of baseline information for this site are the ASI survey, the MPSU conservation plan (2000) and the NATURA 2000 survey. The ecological information given in the NATURA form applies to two sand dune systems – Rush and Portrane - within Rogerstown Estuary SAC and does not distinguish between them. The method of assessment of conservation status differed in NATURA 2000 and only broad comparisons between the conservation status of the two surveys was possible. The conservation status of the Annex I sand dune habitats in Portrane are given in Table 6C.

Table 6C Conservation status of Annex I sand dune habitats at Portrane

Habitat[1]	EU CONSERVATION STATUS ASSESSMENT				
	Favourable	**Unfavourable - Inadequate**	**Unfavourable - Bad**	**Overall EU conservation status assessment**	**Proposed Irish conservation status system[2]**
Fixed Dune (H2130)		Structure & functions Extent	Future Prospects	**Unfavourable - Bad**	Unfavourable-declining
Mobile Dune (2120)	Structure & functions	Extent	Future Prospects	**Unfavourable - Bad**	Unfavourable-declining
Embryonic Dune (H2110)	Structure & functions	Extent	Future Prospects	**Unfavourable - Bad**	Unfavourable-declining
Annual vegetation of driftlines (H1210)	Structure & functions	Extent Future Prospects		**Unfavourable - Inadequate**	Unfavourable-unchanged

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

Details of the numbers and pass/failure rates of monitoring stops used to assess habitat structure & functions at Portrane are shown in Table 6D.

Table 6D Pass/Fail results of monitoring stops of the Annex I sand dune habitats at Portrane

	Monitoring stops			
Habitat	Total stops	**Pass**	**Fail**	**Conservation status**
Fixed Dune (H2130)	8	6	2	**Unfavourable-Inadequate**
Mobile Dune (H2120)	4	1	3	**Unfavourable-bad**
Embryonic Dune (H2190)	4	4	0	**Favourable**

Fixed Dune (H2130)

The extent of the fixed dunes at Portrane is rated as *unfavourable-inadequate* (Table 6C). The fixed dunes are under severe pressure from recreational activities that are exacerbating natural erosion. Some of the fixed dune has been invaded by scrub.

The structure and functions are rated as *unfavourable-inadequate*. Eight monitoring stops were placed in the fixed dunes and two of these failed. The stops that failed were rank and dominated by grass species of improved grassland.

The future prospects for this habitat are considered to be *unfavourable-bad*. The northern part of the site which contains most of the fixed dune and the protected plant species is under serious threat from to both natural erosion and changes due to human activity.

The fixed dunes are suffering erosion in places due to anthropogenic and natural pressures. Some infilling has been carried out by residents near the holiday chalets and houses next to the fixed dunes due to flooding during the storms and high tides in 2002.

A coastal study of Portrane by Kirk McKlure Morton (1998) suggested the use of wooden groynes, sand trapping fences and planting to allow the dunes to rebuild at the breach and save the associated saltmarsh. The sand could be removed at the northern tip (where it is gathering) to deepen the channel and maintain tidal inundation of the saltmarsh by the sea and this sand could be placed in the groyne bays. This would help to protect the fixed dune and saltmarsh while at the same time indirectly protect the property that lies further landward of these habitats. This recommendation has yet to be carried out. Instead rock armour has been installed in the breach and covered with sand and planted with marram. This has not stabilised the breach and the sand and planting has since been removed by winter storms in 2004.

The fixed dunes are also under continuing pressure from development and a dwelling has been recently built (2005) on the seaward edge of the fixed dunes even in the light of obvious flooding and erosion issues that the owners will face in the near future.

There are also plans to put a pipe beneath the outer estuary from rush across to Portrane and it is proposed that this would pass beneath the dunes and saltmarsh at Portrane. The plans for this development were not available at the time of this report.
Overuse of the dunes by visitors and residents is an on-going threat and visitor management will be investigated by NPWS and Fingal County Council (MPSU plan 2000). Until a visitor management strategy is implemented the future prospects remain unfavourable.

The conservation status of the fixed dune was described as *average or unfavourable* in the NATURA 2000 survey and this has been largely attributed to both anthropogenic and natural erosion. The condition of the fixed dune continues to warrant this conservation status. Currently, the overall EU conservation status is rated as *unfavourable-bad*.

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

Mobile Dunes (H2120)

The extent is rated as *unfavourable-inadequate* (Table 6C). This is attributable to a the loss of area due to natural erosion which has been compounded by recreational activities as well as the presence of hard coastal protection in the mobile dunes.

The structure and functions is rated as *unfavourable-bad*. Four monitoring stops were placed in the mobile dunes and three of these failed. The stops that failed contained high cover of unhealthy specimens of the typical plant species *Ammophila arenaria* (Marram grass) and the negative indicator species *Cirsium arvense* (Creeping thistle).

The future prospects are considered *unfavourable-bad* (Table 6C). The threats from recreational activities and coastal protection works are on-going. Until these issues are managed the future prospects remain unfavourable**.**

The mobile dunes were described as showing *average or unfavourable conservation* status in the NATURA 2000 form. The mobile dunes are currently regarded as *unfavourable-bad* under EU conservation status and *unfavourable-declining* under the Irish conservation status system (Table 6C). This poor rating is mainly due to natural erosion and recreational impacts on the dunes.

Embryonic Dunes (H2110)

The EU conservation status is considered as *unfavourable-inadequate*. The Embryonic area is interspersed with large areas of bare sand and shingle which are not apparent on the CMP map. These bare areas are considered a loss due to natural erosion which has been compounded by recreational activity.

Four monitoring stops were placed in the embryonic dunes and all of these passed. Therefore the structure and functions is rated as *favourable.*

The future prospects of this habitat are considered *unfavourable-bad* given the current management of the site for recreational activities. There is also the on-going threat from the installation of hard coastal protection as the pressures from residents to protect property from erosion intensify.

The conservation status of the embryonic dunes was rated, together with the mobile dunes, as *average or unfavourable* in the NATURA 2000 form. The embryonic dunes are currently regarded as *unfavourable-bad* under EU conservation status and *unfavourable-declining* under the Irish conservation status system. This poor rating is mainly due to natural erosion and recreational impacts on the dunes.

Annual Vegetation of Driftlines (H1210)

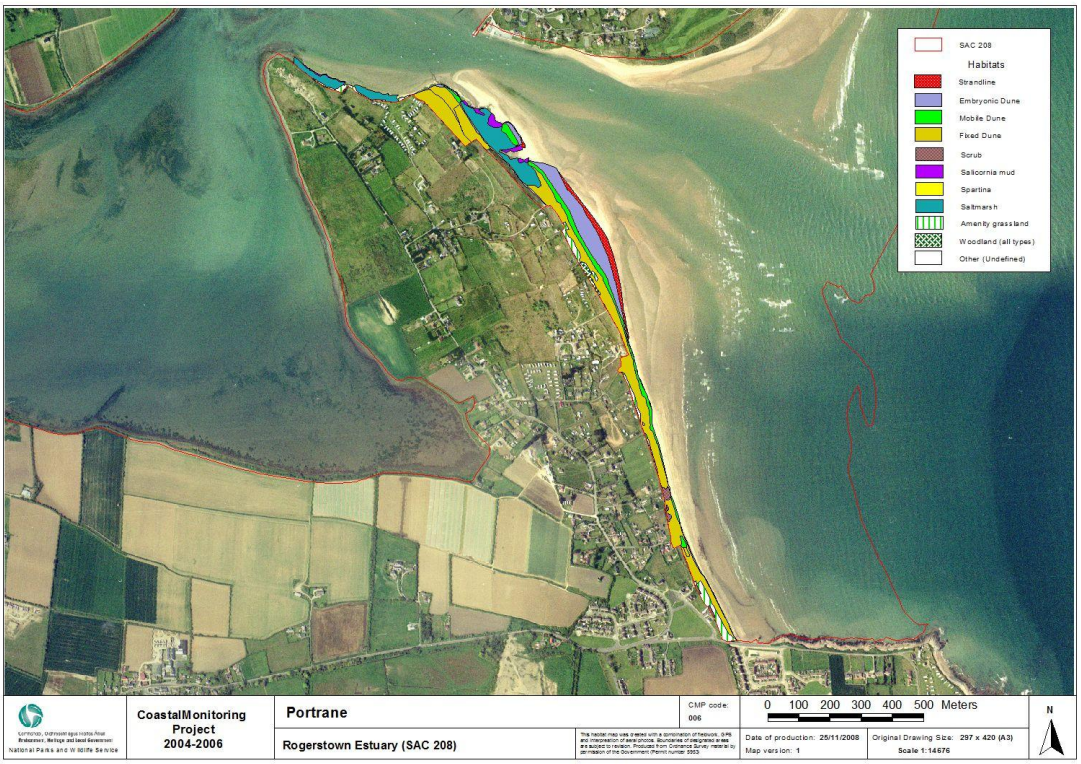
The absence of a strandline habitat along the north and south edge of the site is most likely a result of natural erosion and mechanical beach cleaning. Beach cleaning should be carried out in a way that allows the incorporation of the tidal litter into the dune system. The tidal litter contains nutrients and a seed source for the development of strandline vegetation. Foreign objects, such as, plastic bottles or refuse can be removed manually. Mechanical beach cleaning tends to remove all beach debris such as seaweed and plant remains etc. that are important for strandline development. Therefore the extent is rated as *unfavourable-inadequate*.

The structure and functions parameter is rated as *favourable*. No monitoring stops were placed in the strandline due to equipment problems on the day of survey. However, an overall assessment of the habitat was carried out and a favourable rating is given due to the presence of annual strandline species and the absence of negative indicator species in this habitat.

The future prospects for this site are considered *unfavourable-inadequate.* This is mainly attributable to the on-going threat from recreational activities and beach cleaning.

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

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


SAC 208
Habitats
Strandline
Embryonic Dune
Mobile Dune
Fixed Dune
Scrub
Salicornia mud
Spartina
Saltmarsh
Amenity grassland
Woodland (all types)
Other (Undefined)
Coastal Monitoring Project 2004-2006
Portrane
Rogerstown Estuary (SAC 208)
CMP code: 006
0 100 200 300 400 500 Meters
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:14675
N

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

SITE DETAILS

CMP04 site name:**Rush Sandhills** CMP04 site code:**05** CMP Map No.: **5**

County: **Dublin** Discovery map: **43** Grid Reference: **O 257 529**

6 inch Digital maps: **DU 008**

Aerial photographs (2000 series): **O 2859-A; O 2859-B; O 2791-B; O 2791-C; O 2791-D**

NPWS Site Name: **Rogerstown Estuary**

NPWS designation: NHA **208** SAC **208 (part of)** SPA **4015**
Nature Reserve : **Yes**

Other designations: Corine Biotope Site
Ramsar Site
Wildfowl Sanctuary

Ranger Area: **North Dublin**

MPSU Plan: **Draft 2**

Report Author: **Anne Murray**

SITE DESCRIPTION

Rush sandhills are part of Rogertown Estuary cSAC which is located in the north of County Dublin. The cSAC contains two sand dune systems that lie on either side of the mouth of the estuary and these are dealt with as two separate sites in this project – Rush (CMP code 05) and Portrane (CMP code 06). The cSAC is designated for the Annex I sand dune habitats Fixed dunes (priority habitat) and Mobile dunes. Other Annex I habitats listed for the cSAC include Estuaries, Mudflats and sandflats, Salicornia mud, Atlantic salt meadows and Mediterranean salt meadows.

The outer estuary is designated as a SPA due to the presence of internationally important numbers of Pale-bellied brent geese (*Branta bernicola hrota*) and nationally important numbers of the Annex I species - Golden Plover (*Pluvialis apricaris*) and Bar-tailed godwit (*Limosa lapponica*).

Four Red Data Book plant species have been recorded from the site including *Orchis morio* (Green-winged orchid), *Viola hirta* (Hairy violet), *Hordeum secalinum* (Meadow Barley) and *Papaver hybridum* (Rough poppy). The latter three species are also listed under the Flora (Protection) Order (1999) and are legally protected. Green-winged orchid (*Orchis morio*) and *Viola hirta* (Hairy violet) have been previously recorded in the fixed dunes at Portrane.

Rush Sandhills are located on the northeast of the mouth of Rogerstown estuary. A small beach and narrow band of sand dune occurs south of Rush village. The sand dunes towards the northern end of the beach are heavily disturbed due to recreational activities and the sand dunes to the southern end of the beach are occupied by Rush golf course, residential housing and Rush sailing club with associated buildings and slipway. Sea Buckthorn (*Hippophae rhamnoides*) which was planted by the golf course has invaded most of the fixed dune area beyond the golf course boundary. A small area of open fixed dune occurs between two sections of this dense scrub. The fixed dunes are edged by a narrow band of mobile and embryonic dunes. Natural erosion is impacting this site and this is compounded by human activities including activities associated with the golf course.

The area of sand dune habitat at Rush is 5.725 ha, this excludes the golf course and other developments which total approximately 50ha. Scrub which is mapped separately from the fixed dune area comprises approximately 4ha. The Annex 1 habitats of sand dunes system recorded at Rush are; Fixed Dunes, Mobile dunes and Embryonic dunes. These habitats have been modified greatly by human activity.

Hound's Tongue (*Cynoglossum viride*) was recorded in the fixed dunes during this survey. This plant is becoming a rare species in Ireland due a decline in suitable habitat as a result of overgrazing and development.

Fixed Dune (H2130)

The fixed dune comprises 3.363ha of the total sand dune habitat at Rush (Table 5A).The fixed dune has been largely modified by Rush golf course and urbanisation, covering an estimated area of 30ha..The remaining fixed dune habitat is fragmented and fringes the seaward edge of the golf course. The fixed dunes are lowlying and

have been invaded by scrub, mainly *Hippophae rhamnoides* (Sea Buckthorn). The open areas of fixed dunes are rank and dominated by *Ammophila arenaria* (Marram grass) with some smaller patches of rabbit grazed short turf.

Table 5A EU Annex I sand dune habitats mapped in Rush

EU Code	EU Habitat	Area (ha)
H2110	Embryonic Shifting Dunes	1.169
H2120	Shifting Dunes along the shoreline with *Ammophila arenaria*	0.979
H2130	Fixed Dunes with herbaceous vegetation	3.363
	Total sand dune excluding development/modifications	**5.725**
	Total sand dune including development/modifications	**39.725***

*Approximately 30ha of sand dune has been modified by the golf course and sailing club and another 4ha has been taken over by scrub (mainly *Hippophae rhamnoides* (Sea buckthorn).

There is a relatively poor diversity of typical species in the fixed dune at Rush including *Anthyllis vulneraria* (Kidney vetch), *Arrhenatherum elatius* (False oat-grass), *Carex arenaria* (Sand sedge), *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Common bird's-foot-trefoil), *Ononis repens* (Common restharrow), *Plantago lanceolata* (Ribwort plantain), *Rhinanthus minor* (Yellow rattle), *Taraxacum* agg. (Dandelion) and *Trifolium repens* (White clover).

Other species present in the fixed dunes include *Ammophila arenaria* (Marram grass), *Dactylis glomerata* (Cocksfoot) and *Daucus carota* (Wild carrot).

The negative indicator species present in the fixed dune include *Cirsium arvense* (Creeping thistle), *Senecio jacobaea* (Ragwort) and *Hippophae rhamnoides* (Sea buckthorn). The latter covers approximately 20% of the fixed dune area.

Mobile Dunes (H2120)

A narrow band of highly disturbed mobile dunes extend the length of the beach at rush. The mobile dune comprises 0.979ha of the sand dune habitat (Table 5A). The typical species of the mobile dunes are *Ammophila arenaria* (Marram grass) and *Leymus arenarius* (Lyme grass).

The negative indicator species *Cirsium arvense* (Creeping thistle) and *Hippophae rhamnoides* (Sea buckthorn) occur occasionally throughout the mobile dunes. The

mobile dunes are eroding in the northern part due to a combination of natural erosion and overuse.

Embryonic Dunes (H2110)

The embryonic dunes form the frontline of the dune system at Rush and comprise 1.169ha (Table 5A). The embryonic zone is dominated by *Elytrigia juncea* (Sand couch) with some *Leymus arenarius* (Lyme grass) present also.

There are no negative indicator species in this habitat. The embryonic dunes are highly disturbed, especially in the northern section of the dunes where natural erosion is exacerbated by recreational activites.

Annual vegetation of driftlines (H1210)

Strandline vegetation with annual plants including *Atriplex prostrata* (Spear-leaved orache), *Cakile maritima* (Sea rocket) and *Salsola kali* (Prickly saltwort) recorded at the site in previous studies was not present on the day of survey.

IMPACTS

The activities impacting the sand dune habitats at Rush are listed in Table 5B. The beach at Rush is very popular for bathing during the summer. Beach parking is unrestricted and is considered damaging to the beach and dune system. The sand becomes compacted under the weight of cars etc., it is thought that this can lead to erosion by the reduction of the percolation of outgoing backwash.

The dunes and beach are used for walking/dog walking and horse riding (code 622). Erosion induced by recreational activities and overuse of the dunes (code 720) is apparent with a lot of tracks running through the sand dunes especially towards the northern end. Golfing (code 601) is also popular in the area and Rush golf course occupies the greatest part of the sand dune system (it is excluded from the cSAC). Dumping of grass cuttings from the golf course was evident on the dunes close to the golf boundary. Also, *Hippophae rhamnoides* (Sea buckthorn) planted by the golf course is invading the dunes (code 954) and covers approximately 4ha. Some burning and littering from beach parties was noted in the depressions at the back of the fixed

dunes (code 790). Natural erosion (code 900) is affecting this part of the Dublin coastline and this is exacerbated by recreational activities at Rush.

Table 5B Intensity and impact of various activities on sand dune habitats at Rush

EU Habitat Code[1]	Activity Code[2]	Intensity[3]	Impact[4]	Area affected/ha	Location of Activity[5]
H2110	900	B	0	Unknown	Inside
H2120	900	B	0	Unknown	Inside
H2130	180	C	-1	0.01	Inside
H2130	954	A	-1	4	Inside
21BB	601	B	-2		Outside
21BB	622	B	-1	5	Inside
21BB	623	B	-1	3	Inside
21BB	720	A	-1	5	Inside
21BB	790	C	-1	1	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 5
[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 cSAC. Outside = activities recorded outside but adjacent to sand dune habitat that are impacting the cSAC.

CONSERVATION STATUS

The conservation status of a site is assessed on the current condition of the site and on baseline information. The main source of baseline information for this site was from the ASI survey, the NATURA 2000 report and the MPSU conservation plan (2000).

The sand dune habitats at Rush and Portrane were assessed together in the NATURA survey as they are part of the one cSAC. Also, the method of assessment of conservation status differed in NATURA 2000. Therefore, only broad comparisons between the conservation status of the two surveys were possible. The conservation status of the Annex I sand dune habitats at Rush are given in Table 5C.

Fixed Dunes (H2130)

The extent of the fixed dune is *unfavourable-bad*. Currently, the main impact on the extent of the fixed dunes is the invasion of *Hippophae rhamnoides* (Sea Buckthorn) which covers approximately 1ha (20%) of the total fixed dune area within the cSAC with the remainder 2ha lying outside of the cSAC. Natural erosion exacerbated by recreational activities has also reduced the extent of this habitat, the area affected is difficult to determine and therefore the assessment is based on best scientific judgement.

Table 5C Conservation status of Annex I sand dune habitats at Rush

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

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

Table 5D Pass/Fail results of monitoring stops for Annex I sand dune habitats at Rush

	Monitoring stops		
Habitat	**Pass**	**Fail**	**Conservation status**
Fixed Dunes (H2130)	3	1	**Unfavourable-inadequate**
Mobile Dunes (H2120)	4	0	**Favourable**
Embryonic Dunes (H2110)	4	0	**Favourable**

The structure and functions is *unfavourable –inadequate*. Four monitoring stops were placed in the fixed dune area and one of these failed to reach the targets for negative indicator species as a result of the presence of *Hippophae rhamnoides* (Sea Buckthorn) and also sward height (Table 5D). The fragmentation of the fixed dunes into small areas has reduced the ability of this habitat to function as part of the overall sand dune system.

The results of the monitoring program as part of this project indicate that the fixed dune condition is declining and active conservation management of the dunes is required to restore the habitat. The greatest on-going threat to the sand dune system is invasion by *Hippophae rhamnoides* (Sea Buckthorn). This is threatening the future viability of the habitat. Until scrub invasion is actively managed, the future prospects are considered *unfavourable-inadequate.*

The conservation assessment in the NATURA 2000 survey relates to Portrane and so no comparisons are made in relation to this site. Currently, the overall EU conservation status of the entire fixed dune habitat at Rush is *unfavourable – bad* (Table 5C). This is mainly due to the invasion of *Hippophae rhamnoides* (Sea Buckthorn) and recreational pressures.

Under the Irish scheme, the conservation status for fixed dune at this site is *unfavourable – declining*.

Mobile Dunes (H2120)

The extent of mobile dunes is considered *unfavourable-inadequate*. Natural erosion is compounded by human disturbance in the northern part of the site, mainly due to the susceptibility of this habitat to trampling. A lot of tracks have been created in the mobile dunes due to recreational pressures.

The EU conservation status for structure and function is *favourable*. Four monitoring stops were placed in the mobile dune area and all of these passesd (Table 5D).

The future prospects are considered *unfavourable-inadequate*, due to the on-going threats from recreational activities. These threats are recognized in the conservation plan and it is proposed that visitor management strategies would be investigated. However, the condition of the mobile dunes continues to decline and there are no restrictions on access to the beach and the dunes. The installation of a boardwalk and fencing to allow the mobile dunes to recover would be beneficial. A seawall that has been recently built at Rush Sailing Club is likely to impact the sediment dynamics in the southern part of the site and impact on the extent of the mobile dunes in the future.

The mobile dunes are currently regarded as *unfavourable-inadequate* under the overall EU conservation status and *unfavourable-unchanged* under the Irish conservation status system (Table 5C).

Embryonic Dunes (H2110)

The extent of the embryonic habitat is rated as *unfavourable-inadequate* (Table 5C). Similar to the mobile dunes the embryonic dunes are under severe pressure from

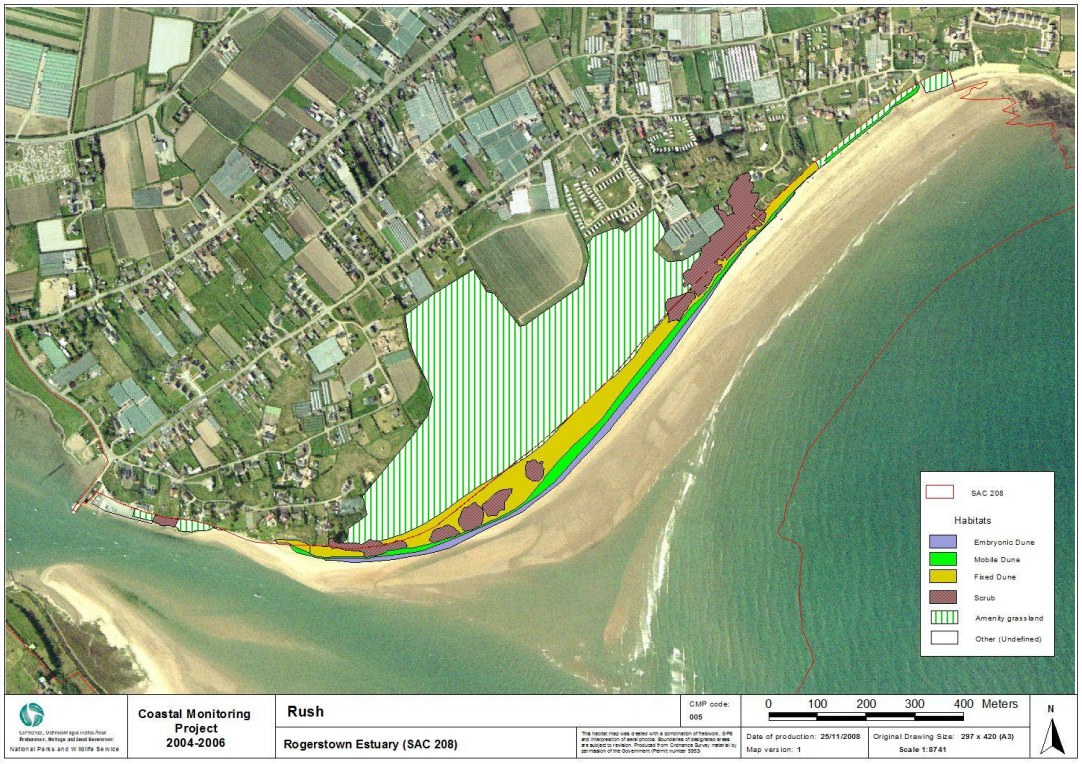
recreational activities. Overuse of these dunes hampers their development and induces erosion.

The structure and functions parameter is rated as *favourable*. Four monitoring stops were placed in the embryonic habitat and these passed (Table 5D).

The future prospects of the embryonic habitat are considered *unfavourable-inadequate*, mainly due to the threats from recreational pressures. Unless a visitor management plan is put into action, as discussed above, the embryonic dunes will continue to decline.

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

The overall Irish conservation status is *unfavourable-unchanged* (5C).


SAC 208
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