Clew Bay SAC (site code 1482)
Conservation objectives supporting document -coastal habitats

NPWS

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Note: Bartraw is sometimes referred to as Bertra in the literature, while Mallaranny is also known as Mulranny.

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.

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, 2003). 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.

Clew Bay is an extremely important coastal site and for geomorphological reasons it was rated an Area of Scientific Interest (ASI) of 'International Importance' (Anon, 1981). It was described as follows:

> 'The classical drowned drumlin landscape showing the sea's erosional action on a drumlin swarm which was laid down by the second advance of ice in the glacial period. Nowhere else is this type of landscape developed on such a scale nor with such variation.'

Clew Bay represents the greatest shingle resource in the country and there are significant deposits of shingle associated with many of the drumlins in the bay. These islands are of particular interest as they represent the only examples of incipient gravel barriers in Ireland.

Clew Bay SAC (site code: 1482) is designated for a range of coastal habitats including vegetated shingle, coastal lagoons, sand dunes and saltmarsh. The following four coastal habitats are included in the qualifying interests for the site:

- Perennial vegetation of stony banks (1220)
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) (1330)
- Annual vegetation of drift lines (1210)
- Embryonic shifting dunes (2110)
- Shifting dunes along the shoreline with *Ammophila arenaria* (2120)

The first habitat represents vegetated shingle, the second is a saltmarsh habitat and the last three are associated with sand dune systems, although all five of these habitats are found in close association with each other.

This backing document sets out the conservation objectives for the five coastal habitats listed above in Clew 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 **shingle** is based in part on the findings of the National Shingle Beach Survey (NSBS), which was carried out in 1999 on behalf of the National Parks and Wildlife Service (NPWS) (Moore & Wilson, 1999). Data held in NPWS from a survey conducted by Dr Tom Curtis in 1991 were also used. Some vegetated shingle was recorded at Rosmurrevagh and Bartraw during the Coastal Monitoring Project (Ryle *et al*., 2009).

The NSBS visited the following 3 sub-sites within Clew Bay SAC:

1. Rosmurrevagh (situated on the northern shore of Clew Bay)
2. Clew Bay Complex (Comprising a collection of drumlins within Clew Bay)
3. Bartraw (situated on the southern shore of Clew Bay)

Profiles and transects were recorded from each shingle beach and each site was assigned a crude High/Medium/Low interest ranking. A 'high interest' ranking denotes a site that is of high conservation value. The site may be of interest botanically or geomorphologically. A 'medium interest' ranking implies the site may be extensive but not of particular interest either botanically or geomorphologically. A 'low interest' ranking is reserved for small sites, highly damaged sites or sites that are of a very common classification. Clew Bay Complex and Bartraw were both rated 'high interest', while Rosmurrevagh was rated 'low interest' due to the presence of anti-erosion measures associated with the golf course. The habitat was not mapped but the vegetation was recorded, as were the human impacts and alterations at the site, which are useful tools for assessing the Structure & Functions of the site.

The targets set for the **saltmarsh habitats** are based primarily on the results of the Saltmarsh Monitoring Project (SMP) (McCorry, 2007; McCorry & Ryle, 2009) and this document should be read in conjunction with those reports.

The SMP surveyed, mapped and assessed a total of ten sub-sites within Clew Bay SAC (McCorry, 2007):

1. Mallaranny
2. Tooreen
3. Rosmurrevagh
4. Tierna
5. Rockfleet Castle
6. Rosharnagh East
7. Caraholly South
8. Killadangan
9. Annagh Island
10. Bartraw

As part of the SMP detailed individual reports and habitat maps were produced for each sub-site and these are included in a set of Appendices to this document (Appendix I to X). The conservation objectives for the saltmarsh habitats in Clew Bay are based on a combination of the findings of the individual reports for each of these sub-sites. There are additional areas of saltmarsh known to be present within the site, however, it is estimated that the ten sub-sites as surveyed by the SMP represents over 85% of the total area of saltmarsh within Clew Bay SAC.

The targets set for the **sand dune habitats** are based primarily on the results of the Coastal Monitoring Project (CMP) (Ryle *et al.*, 2009) and this document should be read in conjunction with that report. As part of the Coastal Monitoring Project (CMP) detailed individual reports and habitat maps were produced for two sub-sites (Bartraw and Rosmurrevagh) and these are included in a set of Appendices to this document (Appendix XI & XII). Bartraw is a tombolo, or a shingle spit that joins an island (Bartraw Island) to the mainland. This spit is topped with a well developed sand dune system. Rosmurrevagh is an extensive area of machair and saltmarsh, with some mobile dune communities also present.

The conservation objectives for the sand dune habitats in Clew Bay 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 represents the total area of sand dunes within Clew Bay SAC, although some of the pioneer communities, in particular the annual vegetation of drift lines and embryonic dunes, may be found elsewhere throughout the site and on some of the islands in the bay (e.g. Inishraher, Inishsoo).

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 Perennial vegetation of stony banks

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

3.1 Overall Objective

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

3.2 Area

3.2.1 Habitat extent

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

Clew Bay is considered to have the most significant shingle reserves in the country, although the exact current extent of this habitat is unknown. The National Shingle Beach Survey recorded this habitat from Rosmurrevagh, Bartraw and Clew Bay Complex, but did not map the extent (Moore & Wilson, 1999). Areas of vegetated shingle were mapped at Bartraw and Rosmurrevagh by Ryle *et al.* (2009). The extent is much greater though when you include the large expanses of shingle that are known to be associated with many of the drumlins found within Clew Bay.

3.3 Range

3.3.1 Habitat distribution

Shingle is currently known to display a widespread distribution throughout the site, occurring in significant quantities along the fringes of the bay (particularly associated with the tombolo at Bartraw) and also in association with many of the drumlin islands in the bay.

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

3.4 Structure and Functions

A fundamental aim of shingle conservation is to facilitate natural mobility. Shingle beaches are naturally dynamic systems, making them of geomorphological interest as well as ecological interest. The islands in Clew Bay are unique in an Irish context as they represent the only examples of incipient gravel barrier formations. They are constantly changing and shingle features are rarely stable in the long term.

3.4.1 Functionality and sediment supply

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

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

3.4.2 Vegetation structure: zonation

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

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

3.4.3 Vegetation composition: typical species & sub-communities

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

The shingle at Rossmurrevagh is described as a vegetated fringing beach. The substrate is stony to sandy, with associated habitats such as inter-tidal shingle, saltmarsh, machair and sand dune. Species present include spear-leaved orache (*Atriplex prostrata*), common cleavers (*Galium aparine*), sea milkwort (*Glaux maritima*), curled dock (*Rumex crispus*) and sea campion (*Silene uniflora*). No lichens were noted.

A number of the islands surveyed by Tom Curtis in 2001, including Inishdeash, Inishcooa, Moynish Beg, Moynish More, Dornish Beg, Inishbee, Inishoo, Inishgowla, Inishgort and Inishraher all possess fine examples of shingle structures and vegetation. Species recorded include spear-leaved orache (*Atriplex prostrata*), common cleavers (*Galium aparine*), sea milkwort (*Glaux maritima*), curled dock (*Rumex crispus*), common chickweed (*Stellaria media*), common scurvygrass (*Cochlearia officinalis*), thistle spp. (*Cirsium* spp.), sea mayweed (*Tripleurospermum maritimum*), wild carrot (*Daucus carota*), creeping red fescue (*Festuca rubra*), biting stonecrop (*Sedum acre*), birdsfoot trefoil (*Lotus corniculatus*), sand couch (*Elytrigia juncea*), sea beet (*Beta vulgaris* ssp. *maritima*), sea rocket (*Cakile maritime*) and sea campion (*Silene uniflora*). A number of sites also displayed good lichen communities, indicating long-term stability.

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

3.4.4 Vegetation composition: negative indicator species

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

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

4 Saltmarsh habitats

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

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

Atlantic salt meadows (ASM) are the only habitat listed as a Qualifying Interest for Clew Bay SAC. However, McCorry (2007) also recorded the presence of *Salicornia* mudflats and Mediterranean salt meadows, although neither habitat constituted a significant component of the saltmarsh system. Detailed descriptions of each habitat in the 10 sub-sites recorded by McCorry (2007) in Clew Bay can be found in Appendices I to X.

4.1 Overall Objectives

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

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

4.2 Area

4.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target is no decrease in extent from the baseline which was established by McCorry (2007). As the baseline recorded some loss in area the conservation objective 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 assessed subject to natural processes, including erosion and succession.

Baseline habitat maps were produced for the saltmarsh in Clew Bay during the SMP. These maps are included with the individual site report in the Appendices at the end of this document.

The total areas of Atlantic salt meadow (ASM) within the SAC and the total area of the habitat within each sub-site as mapped by the SMP are presented in the following table.

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 Clew Bay 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.

In addition to the total area of ASM that was mapped within the SMP, an area of 3.92ha of potential ASM habitat within the SAC was also identified through an examination of orthophotographs. This gives an estimated total area of 38.86ha of ASM within the SAC.

Sub-site	**Total area (ha) of ASM within SAC boundary (including mosaics)**	**Total area (ha) of ASM (excluding mosaics) from SMP in the whole of Clew Bay**
Mallaranny	19.76	19.93
Tooreen	1.06	1.88
Rosmurrevagh	6.40	6.40
Tierna	0.38	0.40
Rockfleet Castle	0.37	0.71
Rosharnagh East	0.03	0.20
Caraholly	0.37	1.68
Kiladangan	0.96	0.86
Annagh Island	5.23	4.45
Bartraw	0.38	0.41
Total	**34.94**	**36.92**
Potential habitat	3.92	
Total	**38.87**	

4.3 Range

4.3.1 Habitat distribution

Saltmarsh is currently known to display a widespread distribution throughout the site, with the main concentrations at Mallaranny and Rossmurrevagh. Atlantic salt meadows are by far the dominant saltmarsh habitat, although there are isolated patches of mosaic communities with *Salicornia* mudflats and Mediterranean salt meadows, particularly at Mallaranny, Kiladangan and Annagh Island.

There should be no decline or change in the distribution of Atlantic salt meadow habitat, unless it is the result of natural processes, including erosion, accretion and succession.

4.4 Structure and Functions

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

4.4.1 Physical structure: sediment supply

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

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

4.4.2 Physical structure: creeks and pans

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

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

4.4.3 Physical structure: flooding regime

The regular ebb and flow of the tide brings salinity, but also nutrients, organic matter and sediment, which are central to the development, growth and indeed survival of saltmarshes.

Saltmarsh vegetation consists of a limited number of halophytic (salt-tolerant) species that are adapted to regular immersion by the tides. Species in the lowest part of the saltmarsh require regular inundation, while those higher up on the marsh can only tolerate occasional inundation.

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

4.4.4 Vegetation structure: zonation

Saltmarshes are naturally dynamic coastal systems. As is the case on the majority of Irish saltmarshes, ASM is the dominant saltmarsh habitat at Clew Bay 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 inter-tidal, shingle and sand dune habitats.

The target is to maintain the range of saltmarsh habitats, as well as transitional zones, including those to terrestrial communities.

4.4.5 Vegetation structure: vegetation height

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

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

4.4.6 Vegetation structure: vegetation cover

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

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

4.4.7 Vegetation composition: typical species & sub-communities

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

The target for this attribute is to ensure that a typical flora of saltmarshes is maintained, as are the range of sub-communities within the different zones. Below are lists of typical species for the different saltmarsh zones, although some of these species have a restricted distribution nationally and may not occur in the Clew Bay area. Turf fucoids, which are diminutive forms of brown algae and typical of western saltmarshes, occur widely.

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

4.4.8 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 planted in Clew Bay in the vicinity of Westport House between 1929 and 1932 (Praeger, 1932). Although isolated clumps of *Spartina* are found scattered throughout the site, this species is not considered a problem at Clew Bay. However, *Spartina* swards have been recorded covering an area of 4.45ha from the Annagh Island sub-site (see site report in Appendix IX) and are considered a threat to the mudflats, although the rate of spread is slow.

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, with no new sites and an annual spread of less than 1% where it is already known to occur.

5 Sand dune habitats

Sand dunes are hills of wind blown sand that have become progressively more stabilised by a cover of vegetation. In general, most sites display a progression through strandline, foredunes, mobile dunes and fixed dunes. Where the sandy substrate is decalcified, fixed dunes may give way to dune heath. Wet hollows, or dune slacks, occur where the dunes have been eroded down to the level of the water-table. 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) *

Five dune habitats were recorded by Ryle *et al*. (2009) but only the three habitats indicated in bold above are listed as Qualifying Interests for Clew Bay SAC. They are all associated with the mobile areas at the front of dune systems. Extensive areas of machair were also found at Rossmurrevagh and fixed dunes at Bartraw.

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.

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. Detailed descriptions from the Coastal Monitoring Project (Ryle *et al.,* 2009) of each sand dune habitat found at Bartraw and Rosmurrevagh are presented in Appendices XI & XII.

5.1 Overall objectives

The overall objective for 'Annual vegetation of drift lines' in Clew Bay SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Embryonic shifting dunes' in Clew Bay SAC is to 'restore the favourable conservation condition'.

The overall objective for 'Shifting dunes along the shoreline with *Ammophila arenaria*' in Clew Bay 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.

5.2 Area

5.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. Baseline habitat maps were produced for the sand dune habitats in Clew Bay during the Coastal Monitoring Project (CMP) (Ryle *et al*., 2009). These maps are included with the individual site reports in Appendices XI and XII at the end of this document. The total areas of each sand dune habitat within the SAC as mapped by the Ryle *et al*. (2009) are presented in the following table. However, it should be noted that there have been significant losses to all three of these habitats at Bartraw as a result of the installation of hard coastal protection works. The CMP did not assess the conservation status of the strandline or the embryo dunes due to their limited extent. However, as much of the coastal protection works were installed since the site was designated in an area that would have previously been occupied by these two habitats, these two habitats should have been given an unfavourable rating for extent.

Habitat	**Areas mapped by Ryle *et al.* (2009) (ha)**		
	Bartraw	**Rosmurrevagh**	**Total**
Annual vegetation of drift lines	0.04	0.08	0.12
Embryonic shifting dunes	0.02	1.38	1.40
Shifting dunes along the shoreline with *Ammophila arenaria*	0.18	0.36	0.54
Total	0.24	1.82	2.06

The target for this attribute in the case of each habitat is 'no decrease in extent from the established baseline'. However, in the case of 'embryonic dunes' and 'shifting dunes along the shoreline with *Ammophila arenaria'* losses were reported during the baseline survey (Ryle *et al*., 2009). Therefore, the conservation objective for these two habitats is that they should be stable or increasing. 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.

5.3 Range

5.3.1 Habitat distribution

Two dune systems occur in Clew Bay: Bartraw and Rosmurrevagh. Bartraw is situated on the southern shore of Clew Bay, while Rossmurrevagh is situated on the northern shore. Strandline and embryonic dunes have also been noted on some of the islands in the bay, including Inishroher and Inishsoo.

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.

5.4 Structure and Functions

The location, character and dynamic behaviour of sand dunes are governed by a combination of geographic, climatic, edaphic and anthropogenic factors. Sand dunes are highly complex, dynamic systems, where the habitats occur in a complex and constantly evolving and changing mosaic. They function as systems in terms of geomorphology and hydrology and maintaining the favourable conservation condition of the habitats present depends on allowing these processes to continue unhindered. Gaynor (2008) higlights the highly transitional nature of much of the vegetation and stresses the need for a holistic approach when considering the conservation objectives of the habitats. Maintaining the favourable conservation condition of all of the sand dune habitats in Clew Bay in terms of structure and functions depends on a range of attributes for which targets have been set as outlined below.

5.4.1 Physical structure: functionality and sediment supply

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

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

It should be noted that Ryle *et al*. (2009) incorrectly assessed natural erosion processes as negative impacts (rather than neutral) in the CMP site report for Bartraw. They further inferred that the construction of hard coastal protection measures were beneficial for the future prospects of the habitats. However, hard coastal protection measures are actually considered a serious threat to the conservation of dune systems and their habitats, as their presence can effectively cut the dunes off from the beach leading to sediment starvation, scouring and increased rates of erosion on adjacent areas.

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

5.4.2 Vegetation structure: zonation

The range of vegetation zones on a dune system should be maintained. Gaynor (2008) highlights the highly transitional nature of much of the vegetation, therefore, it is important that the transitional communities are also conserved. However, the typical zonation of strandline to foredune to mobile dune to fixed dune and/or machair has been somewhat compromised at both sites by the construction of coastal protection measures. Rossmurrevagh displays good transitions between sand dune and saltmarsh communities. Transitions also occur in the site to shingle and inter-tidal habitats.

The target is to maintain the range of dune habitats, as well as transitional zones, including those to the saltmarsh communities.

5.4.3 Vegetation composition: plant health of dune grasses

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

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

5.4.4 5.4.4 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, with Groundsel (*Senecio vulgaris*), Sea Rocket (*Cakile maritima*) and Dandelion (*Taraxacum* sp.) also present. The fixed, more stable dunes support 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*), among others.

Bartraw tombolo supports a characteristic dune flora, details of which can be found in the site report in Appendix XI. Details of the typical species found at Rossmurrevagh can be found in the site report in Appendix XII.

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

5.4.5 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 target is that negative indicators (including non-native species) such as *Hippophae* should be absent or under control.

6 References

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

1 SITE DETAILS

SMP site name: **Mallaranny**		SMP site code: **SMP0011**
Site name (Curtis list): **Mallaranny**		CMP site code: **112**
		Site No: (Curtis list): **68**
NPWS Site Name: **Clew Bay Complex**		Dates of site visit: **13/07 & 07/09/2006**
NPWS designation	SAC: **1482**	MPSU Plan: **not for coastal areas**
	pNHA: **1482**	
County: **Mayo**		Discovery Map: **30** Grid Ref: **082680, 295950**
6 inch Map No: **Ma066**		Aerial photos (2000 series): **01837-b, 01837-d**

Annex I habitats currently designated for Clew Bay Complex SAC:

Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (1330)

Other SMP sites within this SAC/pNHA:

Tooreen, Rosmurrevagh, Teirna, Rockfleet, Roshanagh East, Caraholly South, Kiladangan, Annagh Island, Bartraw

Saltmarsh type: **Lagoon/Sand flats** Substrate type: **Mud/Sand**

2 SITE DESCRIPTION

Mallaranny saltmarsh is located along the north-west shoreline of Clew Bay in County Mayo. This saltmarsh is a well known site and was formerly a pNHA (Site code 1541) before being integrated into the Clew Bay Complex SAC/pNHA. The site is situated south of Mallaranny Village (also spelt Malranny or Mulrany), which overlooks the saltmarsh. The intertidal habitats have developed in a sheltered bay (Trawoughter Strand) and they are surrounded by steeply sloping land that forms the foothills of uplands surrounding this site (Cushlecka, Mallaranny Hill and Cleggan Mountain). These uplands are dominated by dry heath, wet heath, blanket bog and exposed rock. The lower slopes adjacent to Trawoughter Strand contain a ribbon of dwellings and building that are part of Mallaranny Village. Trawoughter Strand is dominated by intertidal sandflats. The largest section of saltmarsh is situated in a small enclosed lagoon to the west of the strand and has developed behind a barrier. The saltmarsh is enclosed to the east by a footbridge and causeway built in 1899 as part of the Great Western Railway Hotel development.

A smaller section of saltmarsh is located to the north-east adjacent to Mallaranny Golf Course (Gannivbaun). The Coastal Monitoring Project also surveyed machair and sand dune habitats at Gannivbaun and Rosmurrevagh in 2006. These coastal habitats are located on a peninsula between Mallaranny saltmarsh and Rosmurrevagh/Tooreen saltmarshes.

Mallaranny saltmarsh is situated 2.5 km south of Bellacragher saltmarsh (SMP0010), and 2.5 km west of Tooreen (SMP0012) and Rosmurrevagh (SMP003).

Three Annex I habitats, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM), are found at this site. Only one, ASM, is listed as a qualifying interest for the Clew Bay Complex SAC. Nearly all the saltmarsh habitat is situated within the SAC. A small strip along the southern section of the main area is excluded unintentionally, as the 6 inch map was used to draw the SAC site boundary. This map is slightly inaccurate in places or boundaries may have changed slightly during the intervening period so that small areas of saltmarsh have been excluded.

The site can be accessed easily by minor roads leading from Mallaranny Village to the beach and pier where car parking is provided by the County Council.

3 HABITATS

3.1 General description

The main saltmarsh area is dominated by Atlantic salt meadows (ASM) (Table 3.1). This is a moderate-sized saltmarsh. Mediterranean salt meadows (MSM) are situated along the western landward boundary and become dominant in the north-west section of the saltmarsh. There is only a minor amount of *Salicornia* flats habitat (1310) present in this area (Table 3.1). A narrow band of ASM is situated along the northern shoreline of Pollnagorr. Narrow ASM is also situated along the northern side of Trawoughter Strand. This connects the main saltmarsh with the smaller saltmarsh area in the north-east section of the strand. The smaller saltmarsh is made up of ASM and MSM is not present. Several clumps of Sea Rush (*Juncus maritimus*) are scattered along this part of the shoreline but they are too small to map as MSM.

The main saltmarsh area is fairly enclosed and sheltered by other habitats. This site was classed as a lagoon-type saltmarsh by Curtis and Sheehy-Skeffington (1998). The southern side is enclosed by a small peninsula extending from the west and a small hill (Pollnagorr). A rocky beach extends along the southern side of these two areas and creates a barrier to enclose the southern side of the saltmarsh. A road extends along this barrier to Mallaranny Pier at Pollnagorr. There are some landward boundaries along the western and the northern parts of the main saltmarsh. These landward boundaries are dominated by wet grassland and scrub. Some of the western landward boundary is marked by an old embankment ditch in the south-west corner. This ditch has cut off a small area of saltmarsh. A fence extends along the top of the embankment and along the landward boundary. A stream flows into the saltmarsh along the western side and the channel through the saltmarsh forms a townland boundary. Conifer trees and Rhododendron (*Rhododendron ponticum*) overhang the saltmarsh along the northern boundary. The eastern side of the saltmarsh is enclosed partly by a man-made causeway with several footbridges. The footbridges cross the large channels

that drain the saltmarsh. The causeway also encloses a large intertidal sandflat area in the north-east corner. The causeway links to a ridge in the centre containing machair grassland. This ridge also contains a concrete hut (toilets). There is a rocky area in the south-east section with rocks, cobble and pebbles extending down onto the saltmarsh. These are probably blown over from the storm beach along the southern side of the barrier.

There is another smaller area of saltmarsh located along the north-eastern side of Trawoughter Strand (Gannivbaun). This saltmarsh has developed in the area where the Murrevegh River enters Trawoughter Strand so there is some minor estuarine development. Saltmarsh has developed on both sides of the river channel and is enclosed by sandy ridge along the southern side with the outflow on the western side. The sandy ridge is dominated by machair grassland. There are also patches of eroding lower/pioneer saltmarsh vegetation along the southern side of this sandy ridge. Between the saltmarsh and the vegetated sandy ridge there is bare sand and patches of embryonic dune. The northern and eastern landward boundaries are marked by Gorse (*Ulex europaeus*) -dominated scrub and wet grassland.

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

EU Code	Habitat	Area (ha)
1310	*Salicornia* and other annuals colonizing mud and sand (1310)	0.002
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	19.93
1410	Mediterranean salt meadows (Juncetalia maritimi)	2.1
	Total	**22.03**

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

This habitat is present on some of the larger creeks on the main saltmarsh. These areas were generally too small to map and were represented by thin strips of (Glasswort (*Salicornia* sp.) -dominated vegetation on (generally < 1 m wide) on narrow sand banks within some of the creeks. These patches are not widespread and are fairly localised in their distribution.

Pioneer saltmarsh is also present along the seaward edge of the main saltmarsh (Info Point 19). This vegetation contains frequent Annual Sea-Blite (*Suaeda maritima*) but it is dominated by Common Saltmarsh-grass (*Puccinellia maritima*) so it is classified as ASM.

3.3 Atlantic salt meadows (H1330)

3.3.1 Main section

Atlantic salt meadow is the predominant saltmarsh habitat at this site. Mallaranny saltmarsh has a very characteristic low tightly cropped (ASM) sward. This sward contains dwarf versions of saltmarsh plants than those seen at other less-intensely grazed sites and there is very little flowering. The vegetation is similar to the southern section of Dooaghtry (SMP0010). A large part of the saltmarsh is situated at a fairly uniform elevation and is dominated by mid-saltmarsh zone plant communities. The sward is dominated by Sea Pink

(*Armeria maritima*) with frequent Sea Plantain (*Plantago maritima*), Common Saltmarsh-grass, Saltmarsh Rush (*Juncus gerardii*) and Sea Milkwort (*Glaux maritima*). Other species present include Buck's-horn Plantain (*Plantago coronopus*), Sea Arrowgrass (*Triglochin maritimum*), Creeping Bentgrass (*Agrostis stolonifera*), Red Fescue (*Festuca rubra*) and Glasswort. Turf Fucoids are also present in this community and this is a feature of local distinctiveness.

There are small mounds within this area with mid-upper zone saltmarsh vegetation but these are generally rare. Upper saltmarsh zone vegetation is mainly situated around the edges of the saltmarsh where there are steeper slopes up to the transitional vegetation or landward boundaries. The vegetation in this zone is characterised by the dominance of Saltmarsh Rush and the occurrence of Buck'shorn Plantain and Long-bracted Sedge (*Carex extensa*).

A complex network of creeks creates an internal network of lower saltmarsh zone vegetation in bands along these creeks. This zone is dominated by Common Saltmarsh-grass with occasionally frequent Glasswort and occasional Annual Sea-Blite. This zone tends to be the most damaged part of the saltmarsh with frequent signs of erosion and poaching. Lower zone and pioneer saltmarsh is situated close to the landward boundary in the south-west section. There are small tussocks remaining that are colonised by Sea Pink. This is unusual and gives an indication of the relative uniformity of the elevation of the saltmarsh surface (quite flat) so that lower zone saltmarsh becomes more extensive.

The lower saltmarsh and pioneer zone is not extensive along the seaward edge of the saltmarsh within the causeway and internal zonation is more prevalent. There are small areas where the lower creek areas are being colonised by Common Saltmarsh-grass-dominated vegetation. A small area of pioneer saltmarsh is located outside the causeway area. This area contains small patches of Common Saltmarsh-grass and scattered Glasswort colonising the sandy shoreline. A narrow band of saltmarsh is situated outside the causeway area along the shoreline of Pollnagarr. This band is dominated by a mixture of Common Saltmarsh-grass and Saltmarsh Rush amongst other saltmarsh species.

The creek structure is very well developed in the main saltmarsh (one of the best seen during the survey). Some of the creeks are internally linked and create saltmarsh 'islands'. A creek is also located along the north-western landward edge of the main saltmarsh. The creek structure is likely to be related to the relatively large extent of saltmarsh being at a similar elevation (0.35 km wide at one point). Pans are much less frequent compared to the creek network. The pans generally are not colonised by Glasswort or other pioneer species. The seaward edge of this habitat along the intertidal flats inside the causeway area is highly dissected with small islands of saltmarsh being created with steep saltmarsh cliffs up to 1 m high. There are several isolated 'islands of saltmarsh at the northern end of the main saltmarsh.

3.3.2 North-west Section

The ASM vegetation of this saltmarsh is similar to the main section. The vegetation is dominated by mid marsh communities and a typical low close-cropped sward has developed. There is internal zonation with lower saltmarsh vegetation appearing along the edges of the smaller creeks and the frequent salt pans in this area. There is a band of upper marsh vegetation with Red Fescue and Long-bracted Sedge predominant in places and Creeping Bentgrass is dominant along the northern side. This area of saltmarsh has a natural transition to machair vegetation along the southern ridge.

This topography of this saltmarsh contrasts with the main area. This saltmarsh contains more frequent salt pans. The creek network is much less developed and this contrast with the main area can be related to differences in the ontological development of the various saltmarshes. There are fewer signs of erosion along the edges of the salt pans and creeks compared to the main section. Poaching damage is reduced in this area. There are signs of erosion and accretion along the river channel dividing this saltmarsh, as the channel shifts position. Banks of accreted sediment are situated on the inside of the meanders of the channel while there is fracturing of the saltmarsh sward and mud balls on the outside edge of the river channel.

There are several patches of ASM saltmarsh to the south of the machair ridge. Eroded patches of mud are present at the western side and there are patches of Common Saltmarsh-grass colonising newly accreted sediment (sandy). This band of lower and pioneer saltmarsh has a band of embryonic dune along the upper boundary adjacent to the edge of the machair ridge, which is eroding. There are patches of mid marsh vegetation in some of the larger sections dominated by Sea Pink and Sea Plantain.

A narrow band of saltmarsh links this saltmarsh to the causeway along the northern boundary of Trawoughter Strand. This band varies between 3-15 m wide and contains some clumps of Sea Rush. The band also displays some zonation of plant communities with a band of upper marsh vegetation along the landward boundary dominated by Creeping Bentgrass. Parsley Water-dropwort (*Oenanthe lachenalii*) is present along this saltmarsh. There are transitions to wet grassland with patches of Yellow Flag (*Iris pseudacorus*). Other species present include Autumn Hawkbit (*Leontodon autumnalis*) and Silverweed (*Potentilla anserina*). The landward boundary is a rocky embankment/dry stone wall along the bottom of a steep embankment.

3.4 Mediterranean salt meadows (H1410)

This habitat is situated within the causeway area in the narrower north-west section of the main saltmarsh. The MSM is generally between 40-70 m wide and dominates this section, although there are patches of ASM along the seaward boundary. There are several isolated clumps of Sea Rush in the south-west section. A mosaic ASM/MSM area is located at the southern end of the main MSM area, as clumps of Sea Rush become more frequent. This

mosaic area contains clumps of Sea Rush interspersed between the typical close-cropped ASM sward (75% MSM). Some plant zonation is evident within the MSM. Species such as Creeping Bentgrass are more prevalent towards the landward side and on some of the mounds while species such as Sea Pink are more prevalent towards the seaward side. Small clumps within the MSM contain ASM vegetation dominated by Saltmarsh Rush and Sea Pink.

The vegetation is dominated by dense Sea Rush creating uniform high sward about 0.5 m high. Other species present include frequent Sea Plantain, Saltmarsh Rush, Creeping Bentgrass and Red Fescue. Species such as Sea Pink, Sea Aster (*Aster tripolium*), Sea Milkwort , Common Scurvygrass (*Cochlearia officinalis*) and Autumn Hawkbit are occasional. The MSM vegetation is generally not affected significantly by grazing.

There are several larger mounds within the MSM that contain coastal grassland species such as White Clover (*Trifolium repens*). One mound contains Gorse bushes. These indicate that these mounds extend above the high water mark.

There are occasional small pans within the MSM. The MSM is also dissected by creeks, although to lesser extent than the ASM, and creeks become less common towards the northern end. This is likely to be due to the narrowing of the saltmarsh. One creek within this area is being revegetated by Common Saltmarsh-grass and Creeping Bentgrass. The north-western section of the saltmarsh is much more topographical variable compared to the main ASM area with mounds and shallow hollows present. A relatively tall saltmarsh cliff is present along the seaward edge of the saltmarsh.

4 IMPACTS AND ACTIVITIES

The most significant activity is sheep grazing (Table 4.1). The activity codes used in Table 4.1 are given in brackets in the following text. Heavy grazing pressure has created a distinctive low sward in the main section. The grazing intensity has not affected the plant sward cover (bare substrate generally < 1%) but at some locations there is poaching induced erosion along the creek and pan edges and in some low-lying areas (142). There is some cattle poaching but this is minor compared to sheep poaching.

The level of poaching is moderate compared to other sites. This has created small eroded hummocks of mud in places. These areas are dominated by lower marsh vegetation with mid marsh vegetation on the small hummocks. These areas have the appearance of recovering slightly from older heavy poaching damage, as there is a predominance of Common Saltmarsh-grass colonising in these areas close the landward side of the marsh. This is an example of reverse zonation of saltmarsh vegetation that has been seen on British saltmarshes prone to erosion of the upper saltmarsh zones. Mallaranny Saltmarsh has a distinctive complex network of creeks. This creek network is unusual due to the width of the creeks in some places. This is likely to be related to the wide expense of saltmarsh at a uniform elevation. However, the poaching-induced erosion may be also widening some of the

creeks. It is difficult to quantify the influence of sheep poaching on the creek structure at this location as the ontological development of this saltmarsh in a lagoon system is also likely to have had a significant influence on the development of the creek system.

There is some difference in grazing pressure between the main saltmarsh area and the north-east section of saltmarsh. The north-east section has a similar characteristic low sward, but there are much fewer signs of poaching induced erosion in this section. This area is not considered to be overgrazed (Table 4.1).

There are several activities affecting this site due to the close proximity of the main saltmarsh section to the track (Table 4.1) and the minor road accessing the beach car park and pier. The saltmarsh is used for overflow car parking during the summer. The saltmarsh is also used for parking several caravans (presumably only during neap tides) (608). This vehicle use has created wheel ruts on the saltmarsh surface (501). A causeway and footbridge extends along the eastern side of the saltmarsh and provides a track from the hotel in Mallaranny Village to the beach. This allows for easy access to the saltmarsh for walkers and dogs (622). There are several telegraph poles crossing the saltmarsh (511). A track used by sheep and walkers is also present on the north-eastern saltmarsh section (501). Some old embankments cross the saltmarsh at the south-west boundary and have cut off some saltmarsh from the main area.

The main saltmarsh is likely to have been affected in the past by the development of the causeway and footbridge, which was built in 1899. A comparison of the 1st edition and 2nd edition 6 inch OS maps indicates that the saltmarsh did not accrete significantly after the construction of the causeway and bridge. The development of the causeway may have affected geomorphological and tidal cycles somewhat and lead to further accretion and growth of the saltmarsh or some erosion (910). A comparison of the 2000 aerial photo to the 1930 2nd edition 6 inch map indicates that some of the main saltmarsh (and sand dune) has been eroded during this period (0.9 ha) (900). There is currently some accretion and development of pioneer saltmarsh (0.25 ha) in this area (910).

Erosion (900) and accretion (910) is occurring along the Murrevegh River channel in the north-eastern saltmarsh section. These impacts are probably compensated each other.

Activities adjacent to the site include some farming on the lower lying areas. Farming activities are mainly grazing of cattle and sheep (140). There is very little improved land (120) and small fields are frequently abandoned and contain wet grassland and scrub. There are several houses are scattered in the area around the bay (403) and Mallaranny Village is situated close to the saltmarsh (401). Mallaranny Beach to the south of the site is used heavily in the summer (629) and there is a small caravan park in adjacent fields (608).

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

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
1330	140	C	-1	19.93	Inside
1330	142	B	-1	12.2	Inside
1330	501	C	-1	< 0.1	Inside
13s	511	C	-1	< 0.001	Inside
1330	608	C	-1	< 0.01	Inside
1330	622	C	-1	12.2	Inside
1330	900	D	-1	12.2	Inside
1330	910	C	+1	0.25	Inside
1410	140	C	-1	2.1	Inside
13s	120	C	0	22.03	Outside
13s	140	C	0	22.03	Outside
13s	401	C	0	22.03	Outside
13s	403	C	0	22.03	Outside
13s	608	C	0	22.03	Outside
13s	629	C	0	22.03	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.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

Overall this site has a moderate or unfavourable inadequate conservation status (Table 5.1). Only one stop failed out of twelve spread over the MSM and ASM. The most significant activity on this site is sheep grazing. There is moderate-heavy grazing pressure on this site. This has created a distinctive close-cropped sward. However, the relatively high stocking rate is also causing poaching-induced erosion of the creek and pan edges. These signs of overgrazing are fairly widespread but they do not occur at a level to fail more stops.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are poor. Mallaranny saltmarsh is bordered by steeply sloping land at its landward boundaries. This means that there are limited prospects for saltmarsh migration up-slope in response to sea level rise. Rises in sea level are likely to erode the seaward edge of the saltmarsh. Much of the main saltmarsh is situated at a similar elevation so a large area will be vulnerable to erosion. There will only be small narrow bands of new saltmarsh created and this will not compensate for habitat lost due to erosion at the seaward edges.

No MPSU Conservation plan is available for the intertidal habitats at this SAC.

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

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

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

5.2.1 Extent

The extent of this habitat is quite small and it is confined to several narrow strips of Glasswort-dominated vegetation on sediment banks in some of the creeks. The intertidal area within the causeway is a suitable area for this habitat and it is unusual that the extent of this habitat is not greater in this area. These sheltered intertidal areas are typical locations for this habitat with patches of Glasswort colonising sediments at suitable elevations. However, the extent of this habitat is assessed as *favourable*, in the absence of no information on the previous extent of this habitat at this site.

5.2.2 Habitat structure and functions

The structure and functions of this habitat is assessed as *favourable*. No monitoring stops were carried out due to the very small extent of the habitat.

5.2.3 Future prospects

The future prospects of this habitat are 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. The sediment banks that this habitat colonises are prone to sudden erosion or accretion in response to geomorphological cycles or storm events.

5.3 Atlantic salt meadows (H1330)

5.3.1 Extent

Overall, the extent of this habitat is assessed as *favourable* in the absence of other information on the previous extent of this habitat. There are signs of poaching-induced erosion along creeks and pans of the main saltmarsh section. Some of these eroded areas are dominated by lower saltmarsh zone vegetation so the overall extent of saltmarsh has not been reduced. The main saltmarsh at Mallaranny is characterised by a complex creek network with some relatively wide creeks. The width of some of these creeks could be related to poaching-induced erosion. However, is difficult to estimate the amount of saltmarsh that has been eroded (and not replaced by lower zone communities) along the edges of these creeks.

There are no indications of any significant loss of habitat due to erosion along the seaward edge of this saltmarsh (within the causeway). Some of the undulations mapped on the 6 inch map are still present in 2000 so some of the seaward edge is relatively stable. There are two small isolated islands of ASM saltmarsh present at the northern end that were not mapped on the 6 inch map and this may be an indication of accretion during this period.

A comparison of the outer seaward boundary of the saltmarsh area mapped on the 6 inch map to the 2000 aerial photo shows that there has been some erosion during this period. However, the eroded area probably was dominated by machair grassland so the loss of saltmarsh is this area may not be significant. The machair grassland ridge may be migrating north-westwards.

5.3.2 Habitat structure and functions

The structure and functions of this habitat is assessed as *unfavourable-inadequate*. Eight stops were carried out in this habitat and seven passed. One stop failed in the main section due to excessive localised erosion that was poaching induced. Sheep grazing is moderate to heavy on this site and has produced a low close cropped sward with dwarfed saltmarsh plants. However, the grazing has generally not caused striping of the sward surface like that seen at Annagh Island. The heavy grazing is impacting indirectly by poaching and this is particularly seen along the lower saltmarsh zones following the edges of the creeks. Some of the edges of the creeks show signs of erosion but the saltmarsh surface was generally not poached significantly. Poaching-induced erosion may be causing the widening of the creek network and some reverse zonation of saltmarsh communities but more detailed monitoring is required to confirm these impacts. Only the main section is affected by excessive poaching-induced erosion and these impacts are not seen on the north-east saltmarsh.

The high levels of grazing on the sward were not excessive enough to fail more than one stop due to the criteria used. The grazing has created a low uniform sward in the ASM and the sward structure is generally quite uniform, although this attribute was not used to fail individual stops.

Other attributes for ASM reached their targets and this saltmarsh has several other features that enhance its conservation value. The ASM has a species diversity typical of this habitat and has several features of local distinctiveness, such as turf fucoids and dwarfed saltmarsh plants. There is some plant zonation particularly along the creeks but the main saltmarsh area is dominated by one main zone. This is due to the general uniform topography and the general flatness of this saltmarsh area. This can also be considered a feature of local distinctiveness and is probably related to the ontological development of the saltmarsh. The north-east saltmarsh section has better-developed zonation with transitions to machair grassland. The lower pioneer zone is represented by patches of Common Saltmarsh-grass, and occasional Glasswort and Annual Sea-blite. These colonise sandy areas around the edges of Trawoughter Strand (outside the causeway area) and along the seaward edge of the machair grassland area.

The creek and pan structure is also very well developed. There is a complex network of creeks in the main section and the north-east section has well-developed salt pans. The north-east section also has a natural transition to machair grassland. The main saltmarsh section does not have significant transitional habitat, as the saltmarsh is situated adjacent to land that has slopes that are too steep for significant transitional habitats to develop. The saltmarsh is part of a larger coastal ecosystem in Trawoughter Strand that contains intertidal sand and mudflats. These transitional and adjacent habitats enhance the conservation value of the saltmarsh. Common Cordgrass (*Spartina anglica*) is not present at this location.

5.3.3 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. Heavy grazing pressure is having a significant impact on this site and is likely to continue in the future. There is no MPSU Conservation plan available for the intertidal habitats in this SAC.

5.4 Mediterranean salt meadows (H1410)

5.4.1 Extent

Overall, the extent of this habitat is assessed as *favourable.* There is no previous information on the extent of this habitat, although it was noted during the NHA survey (1993) that that site did contain a plant community dominated by Sea Rush.

5.4.2 Habitat structure and functions

The structure and functions of this habitat is assessed as *favourable*. Four monitoring stops were carried out in this habitat and they all passed. Grazing is not having as significant impact on the vegetation in this habitat as the Sea Rush shields the other saltmarsh species somewhat. Full size saltmarsh plants are present in the Sea Rush clumps (compared to the dwarfed plants present in the grazed ASM). Other attributes for this habitat reached their

targets. This habitat had a typical species diversity. Some plant zonation was present in this habitat with some species such as Creeping Bentgrass being more abundant nearer the landward boundary. The mosaic area has a diverse sward height structure due to the presence of the Sea Rush clumps. Transition habitats along the MSM are not developed (apart from some signs of freshwater influence at the landward boundary with species such as Yellow Flag). This is due to the fact that the saltmarsh occupies a flat plain surrounded by steeply sloping land, so the transition zone is quite narrow. The creek network is not as complex in this habitat but this is due to the general topography and the fact that the habitat occupies a much narrower area. There is some poaching-induced erosion in the creeks in this habitat but the creek network is not as extensive so this impact is not as significant.

5.4.3 Future prospects

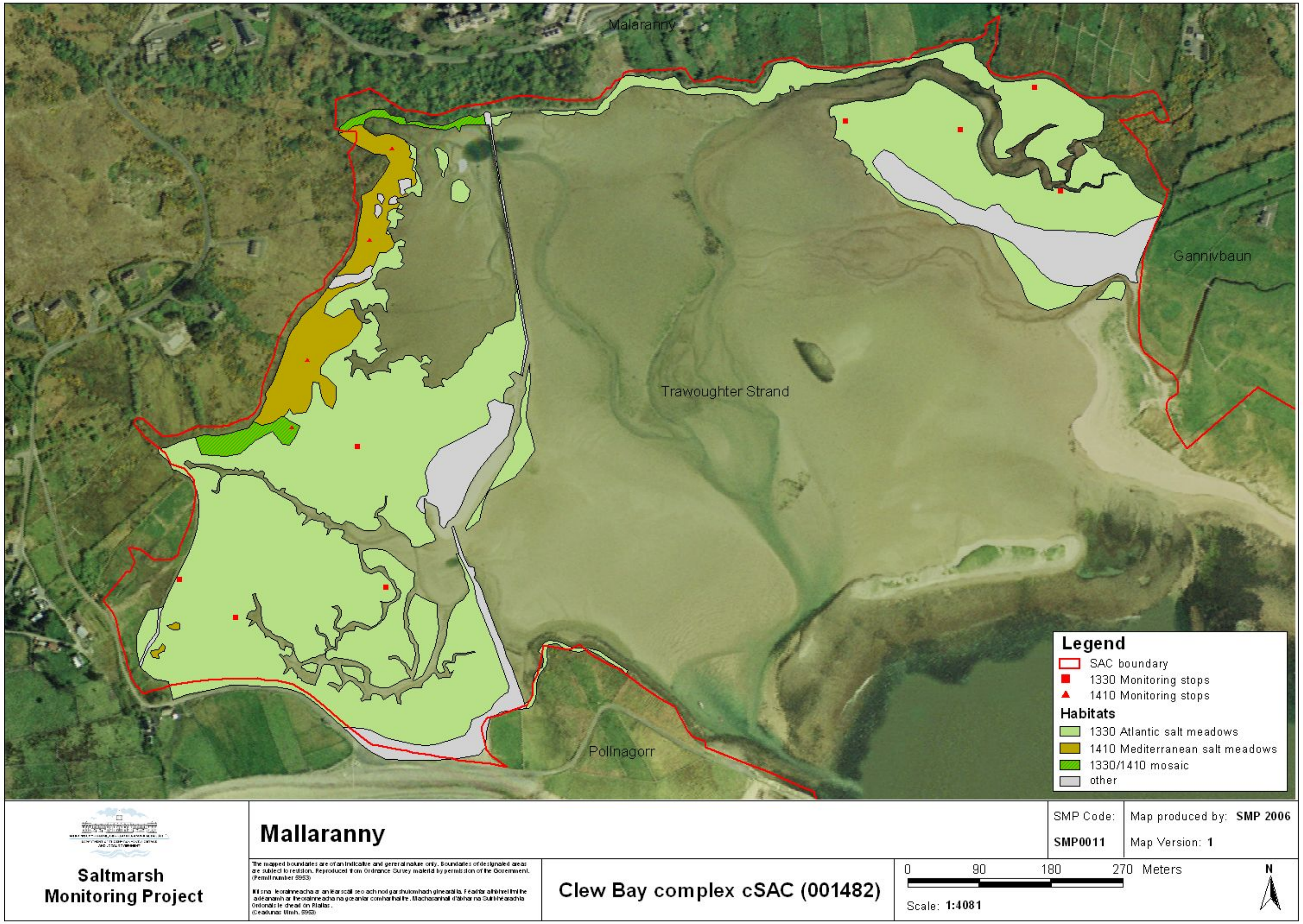
The future prospects of this habitat are assessed as *favourable*. This assessment assumes that the current management activities and level of impacts continue in the near future.

6 MANAGEMENT RECOMMENDATIONS

Some reduction in grazing levels is required to increase the conservation status of the saltmarsh habitats at this site. While grazing is not having the same impact on this site compared to some heavily grazed sites such as Annagh Island and Dooaghtry, it was at a moderate-heavy level and the associated poaching may be inducing erosion.

7 REFERENCES

Curtis, T.G.F.C. and Sheehy-Skeffington, M.J. (1998). The Saltmarshes of Ireland: An Inventory and Account of their Geographical Variation. Biology and Environment: Proceedings of the Royal Irish Academy 98B, 87-104.


Mallaranny
Trawoughter Strand
Gannivbaun
Pollnagorr
Legend
SAC boundary
1330 Monitoring stops
1410 Monitoring stops
Habitats
1330 Atlantic salt meadows
1410 Mediterranean salt meadows
1330/1410 mosaic
other
Saltmarsh Monitoring Project
Mallaranny
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government. (Permit number 5953)
Clew Bay complex cSAC (001482)
SMP Code: SMP0011
Map produced by: SMP 2006
Map Version: 1
0 90 180 270 Meters
Scale: 1:4081
N

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

1 SITE DETAILS

SMP site name: **Tooreen**		SMP site code: **SMP0012**
Site name (Curtis list): **Tooreen**		CMP site code: **not surveyed**
		Site No: (Curtis list): **69**
NPWS Site Name: **Clew Bay complex**		Dates of site visit: **07/09/2006**
NPWS designation	SAC: **1482**	MPSU Plan: **none for coastal areas**
	pNHA: **1482**	
County: **Mayo**		Discovery Map: **45** Grid Ref: **085590, 296090**
6 inch Map No: **Ma015**		Aerial photos (2000 series): **01838-c**

Annex I habitats currently designated for Clew Bay complex SAC:

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

Other SMP sites within this SAC/pNHA:
Mallaranny, Rosmurrevagh, Tierna, Rockfleet Castle, Roshanagh East, Caraholly South, Kiladangan, Annagh Island, Bartraw

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

2 SITE DESCRIPTION

This site occurs along the northern side of Clew Bay, 2.5 km east of Mallaranny, in County Mayo. The main part of the saltmarsh is relatively small (70 m long and 150 m wide) and occurs in a small sheltered inlet where the Bunnahowna River enters Clew Bay. A narrow band of saltmarsh extends along the shoreline of Clew Bay on both sides of the inlet. The narrow saltmarsh breaks up (or is eroded in places) and forms mosaics with rocky shoreline. The band along the shoreline connects this site to Rosmurrevagh to the south. There are intertidal sand and mudflats at the seaward side of the saltmarsh. The landward side of the saltmarsh contains habitats such as dry and wet grassland in grazed fields. There are also patches of semi-natural wet and dry heath and scrub in abandoned fields and unmanaged areas.

Two Annex I habitats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM), are found at this site. Only Atlantic salt meadow is listed as a qualifying interest for the Clew Bay Complex SAC. Most of the saltmarsh habitat is located within the SAC boundary. There is a small area of saltmarsh extending outside the SAC to the west of Bunnahowna River. This is probably an unintentional omission, as the excluded area is quite small.

This site is easily accessed from tracks that lead to the shoreline from minor roads.

3 HABITATS

3.1 General description

The main part of the saltmarsh contains both Mediterranean salt meadow (MSM) and Atlantic salt meadow (ASM) with ASM dominant (Table 3.1). The MSM is mainly confined to a small area adjacent to the river with the seaward side being dominated by ASM. The saltmarsh is dissected by several old river channels. ASM also dominates the saltmarsh that extends around the shoreline.

The upper boundary of the saltmarsh is marked by an old stone wall/embankment in places. This occasionally has a fence or scrub/abandoned hedgerow on stop of the bank. The main part of the saltmarsh transitions to wet grassland and Gorse (*Ulex europaeus*) scrub, which develops along the river banks.

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

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	1.88*
1410	Mediterranean salt meadows (Juncetalia maritimi)	0.34 *
	Total	**2.22**

*note that saltmarsh habitat continues outside the surveyed site.

3.2 Atlantic salt meadows (H1330)

The narrow band of saltmarsh around the shoreline contains several vegetation types and some zonation in places, evident on the more-steeply sloped saltmarsh. The band is up to 15 m wide in places but also narrows and thins out, leaving rocky shoreline or a mosaic with rocky shoreline. The seaward side is dominated by Common Saltmarsh-grass (*Puccinellia maritima*) and Sea Pink (*Armeria maritima*) with frequent Glasswort (*Salicornia* sp.), Sea Milkwort (*Glaux maritima*), Sea Aster (*Aster tripolium*), Sea Arrowgrass (*Triglochin maritimum*), Sea Plantain (*Plantago maritima*) and Common Scurvygrass (*Cochlearia officinalis*) in places. There are also places of Saltmarsh Rush (*Juncus gerardii*) and Red Fescue (*Festuca rubra*). The landward edge contains a band of vegetation dominated by Creeping Bentgrass (*Agrostis stolonifera*) and Autumn Hawkbit (*Leontodon autumnalis*). The saltmarsh has a generally poor structure with no pans or creeks and is heavily poached. Some of the saltmarsh is quite soft and is being affected by freshwater run-off and drainage from the adjoining sloping land. There are occasional signs of freshwater influence in the saltmarsh vegetation with species such as Yellow Flag (*Iris pseudacorus*) encroaching from the landward boundary.

The ASM in the main section of saltmarsh contains similar vegetation. The saltmarsh structure is still poor but there are several salt pans present. Some similar vegetation zonation is present in this area. Clumps of Sea Rush (*Juncus maritimus*) occur scattered through the ASM down to the seaward edge. Parts of this area are also heavily poached.

3.3 Mediterranean salt meadows (H1410)

The habitat is mainly found in the main area of saltmarsh along side both sides of the river channel. The habitat is dominated by Sea Rush (*Juncus maritimus*), although there are patches of ASM within the Sea Rush-dominated area. Other species found amongst the Sea Rush include Creeping Bentgrass, Red Fescue, Sea Milkwort, Saltmarsh Rush, Autumn Hawkbit, Sea Plantain, Sea Aster and White Clover (*Trifolium repens*). There are several small salt pans in the MSM area. The MSM transitions to wet grassland in the north-east corner dominated by Soft Rush (*Juncus effusus*) and also containing species such as Black Bog-rush (*Schoenus nigricans*). Patches of Gorse scrub occur along the river banks and transition directly to Sea Rush -dominated vegetation. This area of MSM is lightly-moderately poached. This habitat also occurs in small patches around the shoreline and forms mosaics with ASM.

4 IMPACTS AND ACTIVITIES

There are few impacts on this site as it is quite small (Table 4.1). The activity codes used in Table 4.1 are given in brackets in the following text. Most of the site shows the effects of poaching (142/143), with the saltmarsh being heavily poached in places. Sheep (and probably cattle) probably move from some unfenced areas such as at Rosmurrevagh and graze the shoreline. The erosion of the seaward edge of parts of the saltmarsh is being exacerbated by cattle and sheep poaching. The grazing level is generally moderate. The ASM is most affected by grazing (moderate) with the MSM being less affected (low-moderate). There are several access points to the shoreline from adjacent minor roads and these cross the saltmarsh, eroding the mud layer and the vegetation.

There are no signs of any overall erosion of the saltmarsh at Tooreen from a comparison of the 2000 aerial photos and 1929 6 inch map. There are some signs of accretion and the growth of saltmarsh since the 1929 6 inch map was drawn.

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

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
1330	142/143	A	-1	1.88	Inside
1410	142143	B	-1	0.34	Inside
13s	501	C	-1	< 0.001	Inside

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

5 CONSERVATION STATUS

5.1 Overall Conservation Status

Both habitats are assessed together as the site is quite small. The overall conservation status of this site is unfavourable (Table 5.1). Extent of both habitats is considered to be *favourable*. There are no indications of any loss of habitat from a comparison of the 2000 aerial photo and the 6 inch map. There is evidence of poaching-induced erosion along parts of the seaward edge of the main section and the narrow band of saltmarsh around the bay so there may be some minor losses in extent (< 1% of the saltmarsh area).

Two monitoring stops were carried out on this site, one in both habitats (MSM and ASM). This site was too small to carry out more then one stop in both habitats. The structure and functions of both habitats are assessed as *unfavourable-bad*. Both stops failed structure and functions due to heavy poaching. These stops were considered to be typical of most of the site. The MSM is in better condition with about 80% being favourable with a low level of poaching. However, the habitat overall fails, as a significant portion (20%) is heavily poached. The other targets for structure and function passed with plant diversity, sward height and plant community zonation all reaching their targets. No Common Cordgrass (*Spartina anglica*) was recorded at this site.

The future prospects of this site is assessed as *unfavourable-bad* in the short term, assuming the current grazing regime is continued and cattle and sheep poaching persists over a significant area of the saltmarsh.

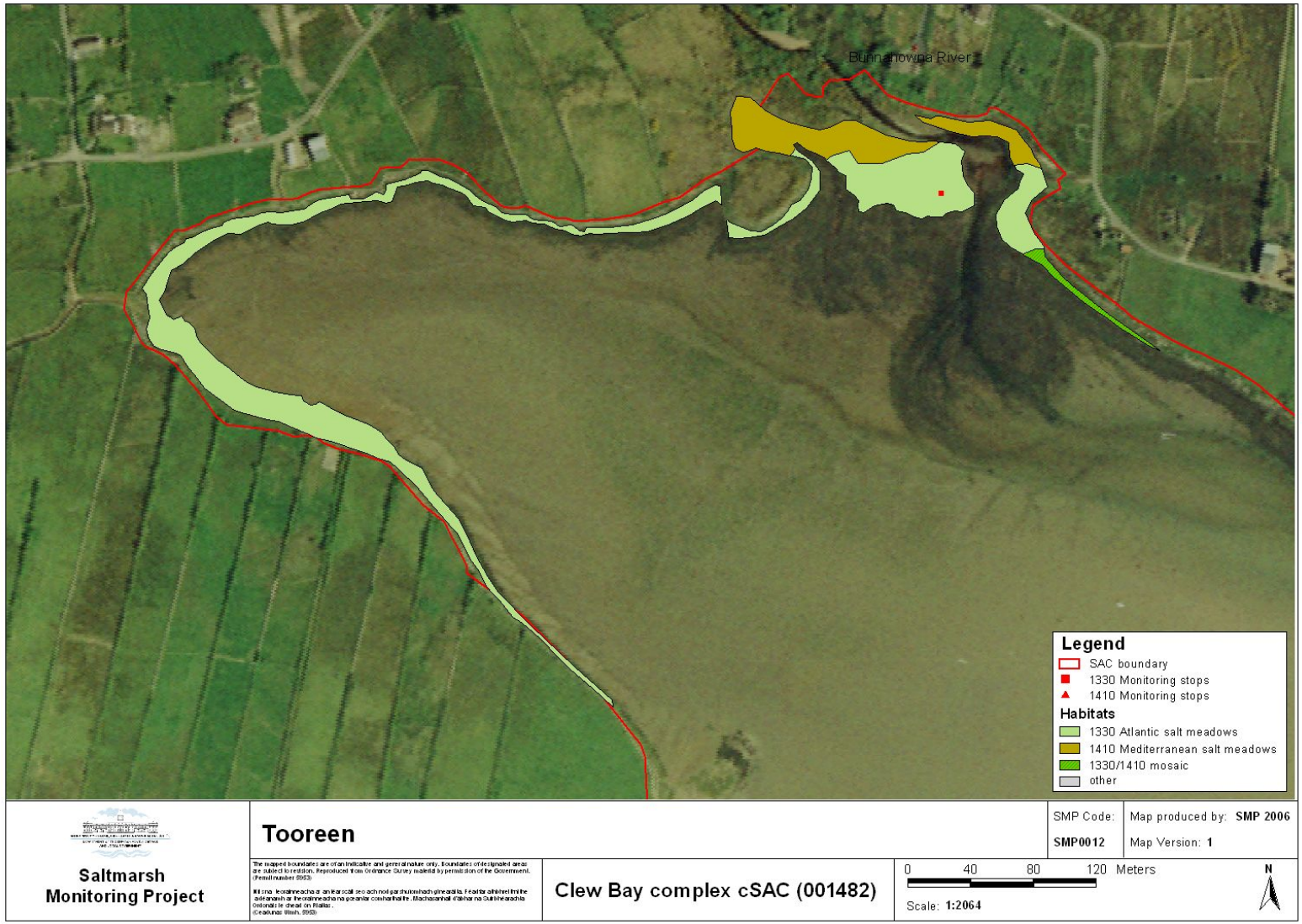
The future prospects of natural landward saltmarsh migration in response to sea level rise are poor. The saltmarsh is quite small and is backed on the landward side by moderately-sloping land. This saltmarsh is likely to be eroded in response to sea level rise.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Tooreen**.**

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

6 MANAGEMENT RECOMMENDATIONS

There are no specific management recommendations for a site this small.


Bunnahowna River
Legend
SAC boundary
1330 Monitoring stops
1410 Monitoring stops
Habitats
1330 Atlantic salt meadows
1410 Mediterranean salt meadows
1330/1410 mosaic
other
Saltmarsh Monitoring Project
Tooreen
SMP Code: SMP0012
Map produced by: SMP 2006
Map Version: 1
Clew Bay complex cSAC (001482)
0 40 80 120 Meters
Scale: 1:2064
N

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

1 SITE DETAILS

SMP site name: **Rosmurrevagh**		SMP site code: **SMP0013**
Site name (Curtis list): **Rosmurrevagh**		CMP site code: **112**
		Site No: (Curtis list): **not on list**
NPWS Site Name: **Clew Bay complex**		Dates of site visit: **07/09/2006**
NPWS designation	SAC: **1482**	MPSU Plan: **none for coastal areas**
	pNHA: **1482**	
County: **Mayo**		Discovery Map: **45** Grid Ref: **085470, 295340**
6 inch Map No: **Ma066**		Aerial photos (2000 series): **01838-c**

Annex I habitats currently designated for Clew Bay complex SAC:

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

Other SMP sites within this SAC/pNHA:
Mallaranny, Tooreen, Tierna, Rockfleet Castle, Roshanagh East, Caraholly South, Kiladangan, Annagh Island, Bartraw

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

2 SITE DESCRIPTION

Rosmurrevagh saltmarsh occurs along the north-western side of Clew Bay, about 2.5 km east of Mallaranny, in County Mayo. This saltmarsh is part of a coastal system including machair, a large beach and sand hills. The machair and other sand dune habitats were surveyed by the Coastal Monitoring Project (2006). The saltmarsh has developed in low-lying land between two hills, Gannivbaun and Rosmurrevagh. The machair transitions to saltmarsh on its western side (Gannivbaun) and continues up the slope of the hill. There are intertidal sand and mudflats at the northern seaward side of the saltmarsh. One large creek drains the saltmarsh and flows north towards the sandflats. A beach and some coastal grassland occur on a ridge at the back of the saltmarsh (the southern side) and separate the site from Clew Bay. There have been some recent blow-outs on the southern side and a channel is now present connecting the saltmarsh and flowing south. A narrow band of saltmarsh develops at the northern end and continues around the shoreline. This part of the shoreline was surveyed as part of Tooreen. The machair used to have a golf course, but this is now abandoned and the area is now grazed. Some of the old greens are still present and several greens were situated in the area now covered by saltmarsh. There are enclosures to the north-west and to

the east of the saltmarsh on the hills. Some of these contain dry grassland and some have been abandoned and now contain rank grassland, Bramble thickets and scrub.

The entire saltmarsh habitat is included within Clew Bay complex SAC. This site is easily accessed via a track through Mallaranny Golf Course and is a path used by local people to visit Rosmurrevagh Beach.

3 HABITATS

3.1 General description

The whole of the saltmarsh is classified as Atlantic salt meadows (ASM) and it is a relatively small site (Table 3.1). It is mainly orientated north-south with zonation from the east to west. Towards the south zonation of plant communities occurs around both sides of the large creek. A transition to machair occurs around the landward side of the saltmarsh, higher on the slope. A low ridge occurs along the seaward edge. No Sea Rush (*Juncus maritimus*) was recorded on this site.

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

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	6.40
	Total	**6.40**

3.2 Atlantic salt meadows (H1330)

The vegetation of the saltmarsh is distinctly zoned as the saltmarsh has developed on a shallow slope. The vegetation is similar to Mallaranny saltmarsh. The dominant zone is the mid-marsh Sea Pink (*Armeria maritima*) and Sea Plantain (*Plantago maritima*) -dominated zone. Other species present include Sea Milkwort (*Glaux maritima*), Common Saltmarsh-grass (*Puccinellia maritima*) and Red Fescue (*Festuca rubra*). This zone does not have much of the distinctive saltmarsh topography with salt pans etc but these develop lower on the slope with the transition to lower marsh vegetation.

There is a raised band of saltmarsh (containing mid zone saltmarsh vegetation) on a low ridge at the seaward side adjacent to the sandflats. A low-marsh zone occurs to the landward side of this zone and is dominated by Common Saltmarsh-grass. Other species present at low densities include Glasswort (*Salicornia* sp.) and Sea Plantain. Bare ground cover is significant in this zone as it is badly poached and disturbed by grazing. Salt pans have also developed in this zone. There is only minor creek development over most of the saltmarsh. A relatively large creek drains the southern section of the saltmarsh.

The upper saltmarsh zone is dominated by a low well grazed sward dominated by Saltmarsh Rush (*Juncus gerardii*) and Red Fescue. Other species appearing in this zone include Creeping Bentgrass (*Agrostis stolonifera*) Buck's-horn Plantain (*Plantago coronopus*) and

White Clover (*Trifolium repens*), in addition to some of the lower saltmarsh species such as Sea Plantain, Sea Pink and Sea Milkwort. This zone is quite flat with very little micro-topography. There are no salt pans or creeks in this zone.

The transition from saltmarsh to machair is not distinctive on the ground, although there are bands of vegetation appearing on the aerial photo. The transition zone contains saltmarsh species such as Sea Pink and Buck's Horn Plantain but moss species become occasionally frequent, along with species such as Birdsfoot (*Lotus corniculatus*).

4 IMPACTS AND ACTIVITIES

Overall, this site is moderately to heavily grazed, with livestock able to move from the machair and other grassland habitats present on the hill down onto the saltmarsh (Table 4.1). Sheep, cattle and donkeys are present on the site. Overall, the saltmarsh shows the effects of heavy poaching (142/143) over a significant area of the saltmarsh (about 30%). The most heavily poached area occurs in the lower saltmarsh zone orientated north-south at the landward side of the low ridge. The saltmarsh topography including the edges of the salt pans is being affected by the poaching. Further back up the slope, the ground is drier (less inundation) and grazing has created a generally smooth sward surface. There are some small patches in the mid-upper zone near the southern end that show the effects of overgrazing and increased bare ground cover.

The seaward edge of the saltmarsh shows signs of erosion (900). There are also signs of overall erosion of the saltmarsh from a comparison of the 2000 aerial photos and 1929 6 inch map. This shows that significant areas of saltmarsh indicated on the 1929 6 inch map (0.98 ha) have been eroded. There are no indications that this erosion has been initiated or exacerbated by construction or coastal protection works in the local area. The erosion of this site could be balanced somewhat by saltmarsh growth at Tooreen (north of this site on the other side of the inlet).

There are some wheel ruts on the surface of the saltmarsh with tractors accessing the adjacent land at Rosmurrevagh. A track across the saltmarsh is located at the northern side of the saltmarsh (501). This track accesses the machair and adjacent enclosures from the shoreline.

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

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
1330	140	C	-1	6.4	Inside
1330	142/143	A	-1	2	Inside
1330	501	C	-1	< 0.001	Inside
1330	900	A	-2	1	Inside

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

5 CONSERVATION STATUS

5.1 Overall Conservation Status

Overall, the saltmarsh at Rosmurrevagh is in poor condition (Table 5.1). There are few activities on the saltmarsh, apart from grazing and associated poaching, but this is having a relatively significant impact. The saltmarsh is part of a larger coastal system at Rosmurrevagh which is of significant conservation value.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are low-moderate. There is some potential for migration of the saltmarsh up the slope, but the incline becomes steeper quite quickly, so the area of potential saltmarsh development is relatively small compared to the existing area. Erosion at the seaward edge would probably be more dominant compared to the creation of new saltmarsh.

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

Habitat	EU Conservation Status Assessment			
	Favourable	Unfavourable - inadequate	Unfavourable - Bad	Overall EU conservation status assessment
Atlantic salt meadows (1330)		Extent	Structure and functions, Future prospects	Unfavourable bad

5.2 Atlantic salt meadows (H1330)

5.2.1 Extent

The extent of saltmarsh at Rosmurrevagh is assessed as *favourable*, even though there has been some loss of habitat (1 ha or about 15%) in the past 80 years. However, there is no information to indicate that there has been significant erosion since the NHA survey or in the past 15 years. There are also no indications that the erosion has been initiated by any

coastal construction. Any erosion is likely to be related to natural geomorphological cycles in the intertidal area of this part of Clew Bay.

5.2.2 Habitat structure and functions

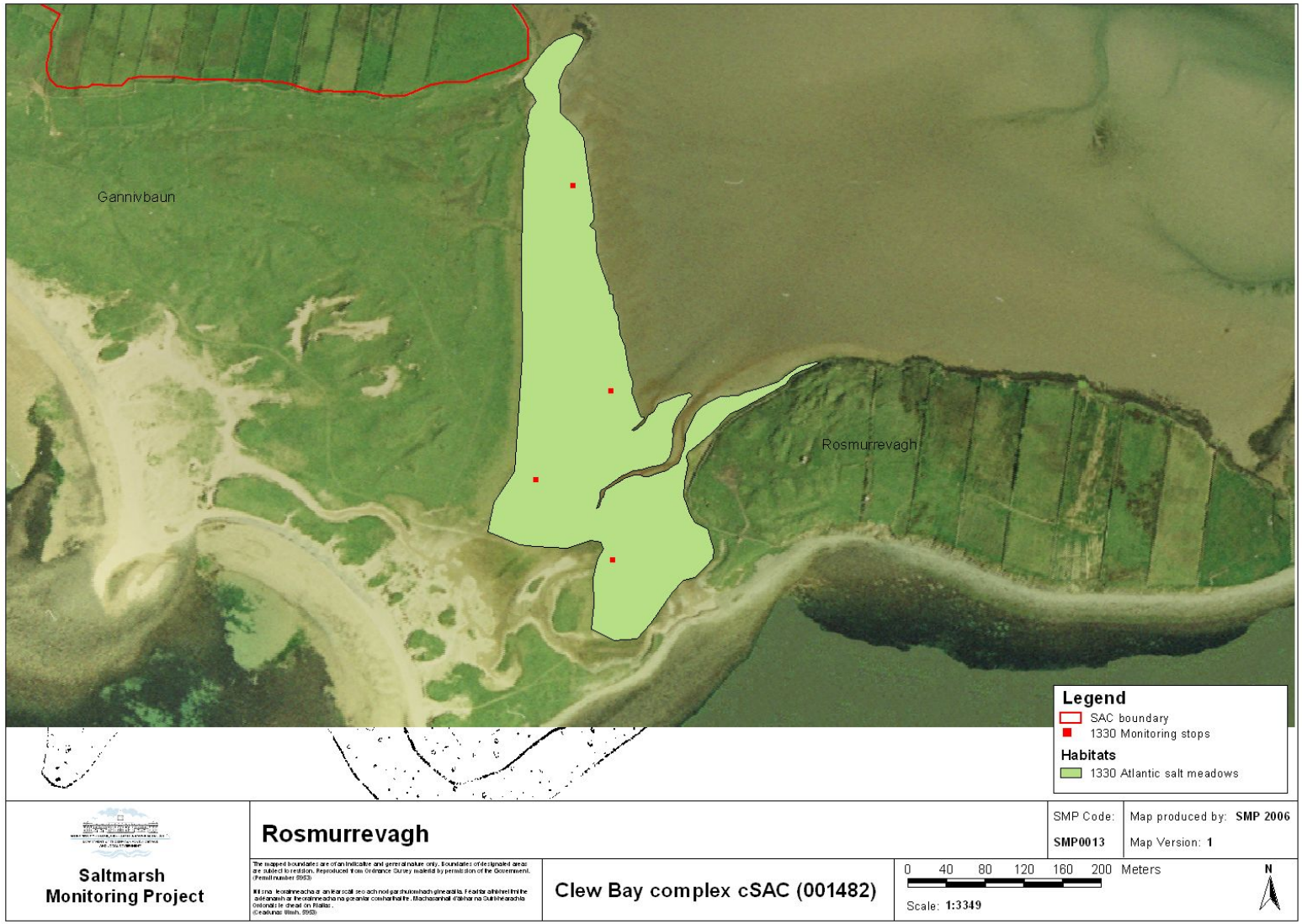
Four monitoring stops were carried out in the ASM and three out of four failed. The three stops failed as they did not reach targets for levels of bare ground, erosion and levels of poaching. The area badly affected by poaching is about 30% of the saltmarsh. The ASM generally has a very low sward due to moderate-high sheep and cattle grazing. The species diversity is typical of ASM with most of the typical species being present. The conservation value of the site is increased by the presence of a natural transition to machair.

5.2.3 Future prospects

The future prospects of the ASM are assessed as *unfavourable-bad* in the short term, assuming the current grazing regime is continued and sheep and cattle stocking rates are not reduced. Cattle are probably having the greatest impact on the saltmarsh. There is no current conservation plan for this site to manage the level of grazing.

6 MANAGEMENT RECOMMENDATIONS

A MPSU Conservation plan is required for the terrestrial parts of the SAC. Some de-stocking is required to alleviate the impacts of poaching. Poaching and livestock stocking levels could be managed as part of this conservation plan.


Gannivbaun
Rosmurrevagh
Legend
SAC boundary
1330 Monitoring stops
Habitats
1330 Atlantic salt meadows
Saltmarsh Monitoring Project
Rosmurrevagh
SMP Code: SMP0013
Map produced by: SMP 2006
Map Version: 1
Clew Bay complex cSAC (001482)
0 40 80 120 160 200 Meters
Scale: 1:3349
N

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

1 SITE DETAILS

SMP site name: **Tierna**			SMP site code: **SMP0014**
Site name (Curtis list): **Tierna**			CMP site code: **not surveyed**
			Site No: (Curtis list): **71**
NPWS Site Name: **Clew Bay complex**			Dates of site visit: **13/07/2006**
NPWS designation	SAC: **1482**	MPSU Plan: **none for coastal areas**	
	pNHA: **1482**		
County: **Mayo**		Discovery Map: **30**	Grid Ref: **089380, 295751**
6 inch Map No: **Ma067**		Aerial photos (2000 series): **01839-c**	

Annex I habitats currently designated for Clew Bay complex SAC:

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

Other SMP sites within this SAC/pNHA: **Mallaranny, Tooreen, Rosmurrevagh, Rockfleet Castle, Roshanagh East, Caraholly South, Kiladangan, Annagh Island, Bartraw**

Saltmarsh type: **Fringe** Substrate type: **Gravel/peat**

2 SITE DESCRIPTION

Tierna saltmarsh is located along the north side of Clew Bay, 6 km east of Mallaranny in Co. Mayo. This is a fringe type saltmarsh. The landscape at this location is undulating with frequent small drumlin hills and islands typical of Clew Bay developing. The saltmarsh habitats extend around the shoreline of a small bay, north of Inishbobunnan Island and Beetle Island North. The bay contains intertidal sand and mudflats divided by small estuarine channels. The intertidal areas are generally quite rocky around the shoreline. There are two small 'islands' of saltmarsh in the bay south of the shellfish processing plant. This site is 3 km west of Rockfleet Castle and 4 km east of Tooreen (SMP sites).

Two Annex I habitats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM) are present at this site. Only ASM is listed as a qualifying interest for this SAC. About 50% of the saltmarsh habitat is situated within the Clew Bay Complex SAC. Sections of the fringe shoreline are situated outside the boundary because the old shoreline boundary from the 2nd edition OS 6 inch map was used to mark the SAC boundary. The position of the shoreline as indicated by the 6 inch map is slightly inaccurate when overlain by the 2000 aerial photo. This is most likely to be due to rectification errors but the shoreline may have also changed slightly in this period as well. The shoreline errors are exacerbated due to the narrowness of the saltmarsh fringe, which means even small differences may be significant.

The site can be accessed easily via a minor road leading from the Newport-Mallaranny Road to the shoreline. The shoreline can be accessed via tracks onto the intertidal areas used by the shellfish processing plant.

3 HABITATS

3.1 General description

This is a fringe type saltmarsh with narrow bands of vegetation generally between 3-10 m wide following the shoreline. This band of saltmarsh is sometimes discontinuous and breaks up, leaving a rocky or pebbly shoreline. Sometimes the shoreline is eroded and the saltmarsh forms a mosaic with rocky or pebbly habitats. The vegetation is classed as either Atlantic salt meadows (ASM) or Mediterranean salt meadows (MSM) depending on the dominance of Sea Rush (*Juncus maritimus*). MSM is dominant (Table 3.1). Some sections of the shoreline contain a mixture of vegetation with Sea Rush or ASM vegetation equally dominant, so this was mapped as a mosaic. A small area of saltmarsh (CM2) in an inlet towards the west is dominated by Common Reed (*Phragmites australis*), indicating some freshwater influence. This brackish habitat is not classified as ASM.

There are occasionally larger areas of saltmarsh in some of the small sheltered inlets, but due to the size of these bays these areas are still relatively small, compared to other sites. A stream flows into the eastern bay and there is saltmarsh development along the stream transitioning into wet grassland. A similar saltmarsh fringe is also present around the shoreline of the larger islands. There are several small saltmarsh islands within the bay with saltmarsh vegetation having developed on relic patches of peat that overlay rocky outcrops. The dominant habitat in the surveyed area is MSM (Table 3.1).

Land is generally moderate-steeply sloped close to the shoreline so the development of saltmarsh is generally poor and occupies a narrow zone. Improved grassland, wet grassland and scrub are most common habitats that are situated adjacent to the saltmarsh. Occasionally some coastal grassland develops between the saltmarsh strip and the field boundary. This is indicated by species such as Birdsfoot (*Lotus corniculatus*) and Long-leaved Plantain (*Plantago lanceolata*). The landward boundary is generally marked by overgrown hedges that are sometimes planted on rocky ditches/stone walls or embankments. Some of the saltmarsh boundary is marked by fence lines.

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

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	0.40*
1410	Mediterranean salt meadows (Juncetalia maritimi)	0.57*
	Total	**0.97***

*note that saltmarsh habitat continues outside the surveyed area.

3.2 Atlantic salt meadows (H1330)

The ASM is dominated by Saltmarsh Rush (*Juncus gerardii*) and Red Fescue (*Festuca rubra*) with frequent Sea Pink (*Armeria maritima*), Sea Milkwort (*Glaux maritima*) and Sea Plantain (*Plantago maritima*). The vegetation is generally quite uniform and there is little or no zonation along the narrower strips (< 5 m). The seaward edge generally has Common Saltmarsh-grass (*Puccinellia maritima*) and occasional Lax-flowered Sea Lavender (*Limonium humile*). Other species present include Sea Arrow-grass (*Triglochin maritimum*), Sea Aster (*Aster tripolium*), Sea Milkwort and Glasswort (*Salicornia* sp.). The ASM is rocky in places. A saltmarsh cliff is present along the seaward edge and this looks eroded in places. The wider strips (5-10 m) have some zonation with Saltmarsh Rush and Red Fescue dominating the upper zone and Common Saltmarsh-grass dominated the lower zone. Clumps of Sea Rush are occasionally present in the ASM and where they become frequent the saltmarsh is mapped as a mosaic of 1330/1410 (ASM/MSM).

There are several small saltmarsh 'islands' in the bay. There is a 1-2 m high peat saltmarsh cliff around the eastern side of the small islands within the bay. The islands show some zonation of saltmarsh vegetation. The vegetation is dominated by mid marsh saltmarsh communities with Sea Pink and Sea Plantain. Other species present include Common Saltmarsh-grass, Buck's-horn Plantain (*Plantago coronopus*) and Sea Aster. A lower saltmarsh cliff or 'step' is present. There is some development of coastal grassland on the small saltmarsh islands within the bay. This has developed on the more elevated areas and is indicated by the presence of Birdsfoot and White Clover (*Trifolium repens*) amongst grassland dominated by Red Fescue and Creeping Bentgrass.

3.3 Mediterranean salt meadows (H1410)

This habitat is generally dominated by dense Sea Rush. Other species also present within the Sea Rush include Autumn Hawkbit (*Leontodon autumnalis*), Creeping Bentgrass, Sea Milkwort, Sea Aster, Red Fescue, Saltmarsh Rush, Sea Plantain and Common Scurvygrass (*Cochlearia officinalis*). There is generally a narrow band of saltmarsh dominated by Saltmarsh Rush and Red Fescue at the landward side of the Sea Rush before the transition to terrestrial vegetation or a rocky embankment.

This habitat has a similar topography to the ASM. There are very few pans along the fringe. A saltmarsh cliff is present along the seaward edge.

4 IMPACTS AND ACTIVITIES

The shoreline in this area is grazed by sheep (140). This is the main activity at this site (Table 4.1). Sheep cross the intertidal flats at low tide and access some of the islands. The saltmarsh is generally lightly grazed and poached by sheep. There are also signs of poaching by cattle, but cattle grazing is probably rarer. Several tracks access the shoreline and the intertidal flats and cross saltmarsh at various locations (502). Some of the tracks are used by an adjacent shellfish processing plant.

Activities adjacent to the saltmarsh habitats include farming (120, 140), dwellings (403), roads (502) and aquaculture (200).

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

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
13s	140	C	0	0.97	Inside
13s	501	C	-1	< 0.1	Inside
13s	120	C	0	0.97	Outside
13s	140	C	0	0.97	Outside
13s	200	C	0	0.97	Outside
13s	403	C	0	0.97	Outside
13s	502	C	0	0.97	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.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

The two habitats are assessed together as no monitoring stops were carried out at the site. Much of the saltmarsh is a mosaic with the two habitats occurring in conjunction with each other.

5.1.1 Extent

Overall, the extent of both habitats are assessed as *favourable* (Table 5.1). There is no previous information on the extent of saltmarsh at this location. There are no signs of erosion at this location. Two small saltmarsh 'islands' are still present in the bay. These two islands were noted on the 1930 6 inch map. Saltmarsh continues along the shoreline outside the surveyed area.

5.1.2 Habitat structure and functions

Overall, the structure and functions of these habitats are assessed as *favourable*. No monitoring stops were carried out at this site as the saltmarsh was relatively narrow. An

overall visual assessment was made for the whole surveyed area. The species diversity at this site was typical of this habitat. Several attributes such as zonation and pan and creek structure are poor, but this is typical of a fringe type saltmarsh.

No Cordgrass (*Spartina anglica*) was recorded at this site.

5.1.3 Future prospects

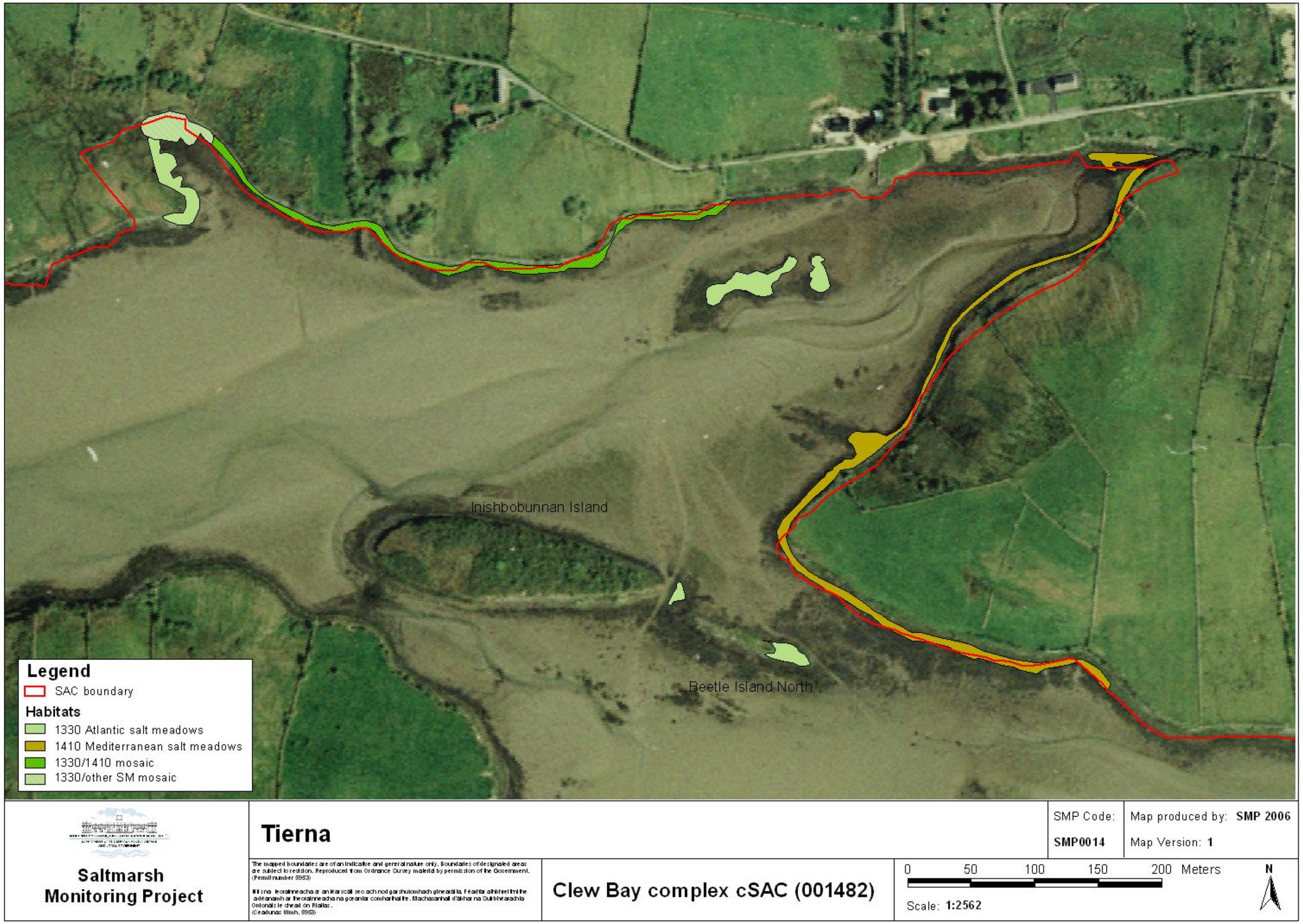
The future prospects of these habitats are assessed as *favourable*. This assessment assumes that the current management activities and level of impacts continue in the near future.

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

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

6 MANAGEMENT RECOMMENDATIONS

None


Inishbobunnan Island
Beetle Island North
Legend
SAC boundary
Habitats
1330 Atlantic salt meadows
1410 Mediterranean salt meadows
1330/1410 mosaic
1330/other SM mosaic
Saltmarsh Monitoring Project
Tierna
SMP Code:
SMP0014
Map produced by: SMP 2006
Map Version: 1
Clew Bay complex cSAC (001482)
0 50 100 150 200 Meters
Scale: 1:2562
N

Appendix V –Rockfleet Castle site report and habitat map from the Saltmarsh Monitoring Project (McCorry, 2007)

1 SITE DETAILS

SMP site name: **Rockfleet**		SMP site code: **SMP0015**
Site name (Curtis list): **Rockfleet Castle**		CMP site code:
		Site No: (Curtis list): **73**
NPWS Site Name: **Clew Bay complex**		Dates of site visit: **13/07/2006**
NPWS designation	SAC: **1482** pNHA: **1482**	MPSU Plan: **none for coastal areas**
County: **Mayo**		Discovery Map: **31** Grid Ref: **093130, 295270**
6 inch Map No: **Ma067**		Aerial photos (2000 series): **01840-c, 01900-a**

Annex I habitats currently designated for Clew Bay complex SAC:

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

Other SMP sites within this SAC/pNHA:
Mallaranny, Tooreen, Rosmurrevagh, Teirna Roshanagh East, Caraholly South, Kiladangan, Annagh Island, Bartraw

Saltmarsh type: **Fringe** Substrate type: **Mud/peat**

2 SITE DESCRIPTION

Rockfleet saltmarsh is located around the edges of Rockfleet Bay, along the northern side of Clew Bay in County Mayo. Rockfleet Bay is located 5.5 km west of Newport. The survey area encompasses the whole of the bay. The bay mainly contains a rocky shoreline. However, fringe type saltmarsh has developed in sheltered areas on patches of relic peat/mud along the shoreline. The patches of saltmarsh are discontinuous and isolated from each other. The landscape at this location is undulating with frequent small drumlin hills and islands typical of Clew Bay developing. Rockfleet Castle is located at the east of the bay and some saltmarsh that overlays a rock ledge is situated adjacent to it. This site is 3 km west of Tierna (SMP site 0014).

Two Annex I habitats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM), are present at this site. Only Atlantic salt meadow is listed as a qualifying interest for this SAC. About 50% of the saltmarsh habitat is situated within the Clew Bay Complex SAC. Sections of the shoreline are situated outside the boundary because the old shoreline boundary from the 6 inch map was used to mark the SAC boundary. The position of the shoreline as indicated by the 6 inch map is slightly inaccurate when overlain by the 2000 aerial photo. This is most likely to be due to rectification errors but the shoreline may have

also changed slightly in this period as well. The shoreline errors are exacerbated due to the narrowness of the saltmarsh fringe, which means even small differences may be significant.

The site can be accessed easily via a minor road leading from the Newport-Mallaranny Road to Rockfleet Castle and a small pier to the west.

3 HABITATS

3.1 General description

The saltmarsh habitats are generally confined to Rockfleet Bay. There are several very small eroded patches of saltmarsh south of the pier on the west side. Annual Sea-blite (*Suaeda maritima*) also colonises the strandline on shingle/pebbles in this area. One the eastern side the saltmarsh eventually peters out and the shoreline becomes rocky. The Mediterranean salt meadow (MSM) is confined to two patches on the western side of the bay. Patches of Atlantic salt meadow (ASM) are scattered around the remaining sides, and dominates the saltmarsh habitats (Table 3.1). The saltmarsh has developed on varying depths of peat/mud, which is sometimes quite thin and eroded in places. The peat/mud overlays bedrock or rocky deposits in places.

In general, an eroded saltmarsh cliff is present at the seaward side of the saltmarsh. The habitats at the seaward side of the saltmarsh vary between rocky deposits, gravel and mud in the intertidal area. The landward boundaries vary and there are very little transitional habitats present along the bay shoreline. The saltmarsh situated adjacent to the minor road that follows the northern shoreline. A track across the strandline is also located along a wall north of the castle and accesses some fields. Several patches of Yellow Flag (*Iris pseudacorus*) are situated above the strandline along the wall. The eastern ASM section does have a small transition into wet grassland. The MSM at the west side of the bay has developed along a rock embankment/wall towards the west and there is no transitional habitats. Further east there is a longer gradient and the saltmarsh transitions to rank grassland dominated by Twitch (*Elytrigia repens*).

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

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	0.71
1410	Mediterranean salt meadows (Juncetalia maritimi)	0.09
	Total	**0.80**

3.2 Atlantic salt meadows (H1330)

The largest area of ASM is located in the eastern part of the bay. This area is badly disturbed by cattle poaching. Saltmarsh has developed on peat/mud. A drain crosses the saltmarsh and divides it. Part of the saltmarsh is fenced off. There is some zonation of vegetation.

Common Saltmarsh-grass (*Puccinellia maritima*) and Sea Milkwort (*Glaux maritima*) dominate the seaward boundary. The saltmarsh is dominated by Sea Plantain (*Plantago maritima*), Sea Aster (*Aster tripolium*) and Sea Pink (*Armeria maritima*), with frequent Sea Arrowgrass (*Triglochin maritimum*), Common Scurvygrass (*Cochlearia officinalis*) and Saltmarsh Rush (*Juncus gerardii*). Other species in upper saltmarsh zone with Red Fescue (*Festuca rubra*) and Creeping Bentgrass (*Agrostis stolonifera*) include Autumn Hawkbit (*Leontodon autumnalis*) and Long-Bracted Sedge (*Carex extensa*). There are frequent rocks on this saltmarsh. Some eroded patches/salt pans contain stones and pebbles. There is a transition to wet grassland at scrub at landward side that contains Creeping Bentgrass, Yellow Flag, Soft Rush (*Juncus effusus*), Silverweed (*Potentilla anserina*) and Dock sp. (*Rumex* sp.). The saltmarsh structure is generally quite poor and is typical of fringe saltmarsh with few pans.

There are several eroded isolated patches of ASM situated on thin bands of sediment overlaying rock and rocky deposits. These patches have similar vegetation. This area has an eroded saltmarsh cliff at edge of some patches up to 0.5-1 m high. A patch of ASM north of Rockfleet Castle has developed on a thin band of mud and overlays bedrock. This area is dominated by Red Fescue and Saltmarsh Rush higher up the shoreline, while patches of Sea Pink and Sea Plantain dominated vegetation appear lower on the shoreline.

3.3 Mediterranean salt meadows (H1410)

This habitat is located at the western side of the bay close to Raigh Pier. Several narrow strips of saltmarsh dominated by Sea Rush (*Juncus maritimus*) are situated along the shoreline. There are patches of ASM vegetation amongst the Sea Rush-dominated areas. Other species amongst the Sea Rush and in ASM patches include Saltmarsh Rush, Sea Aster, Common Saltmarsh-grass, Sea Arrow-grass, Common Scurvygrass, Sea Plantain, Lax-flowered Sea Lavender (*Limonium humile*), Long-Bracted Sedge (*Carex extensa*) and Red Fescue. Species such as Creeping Bentgrass, Twitch and Frosted Orache (*Atriplex lacinata*) appear on the strandline.

The saltmarsh has developed on peat/mud on a generally narrow strip, although it widens to 25 m at the telegraph pole. There is a low saltmarsh cliff (20-30 cm high) along the edge of part of this habitat. Further along the MSM, some Sea Rush is colonising along the edge of the saltmarsh in gravel/mud. There is very little development of saltmarsh topography with several small pans being present. There were no creeks although there are several drains crossing the saltmarsh.

4 IMPACTS AND ACTIVITIES

There is a relatively large range of activities affecting this saltmarsh compared to other sites (Table 4.1). The activity codes used in Table 4.1 are given in brackets in the following text. This is related the relative proximity of the site to dwellings and the minor road along the shoreline, meaning access is easier. The main activity is cattle grazing and poaching (143)

as this affects the largest area. Some of the saltmarsh was fenced off and was badly poached inside the enclosure as were the transitional habitats (wet grassland). The eastern side was grazed and badly poached. The shoreline is also used for moving cattle from one pasture to another, so saltmarsh outside the fence was also poached. A track crosses the back of the saltmarsh (501) and is used for accessing adjacent pasture.

Tourists use the shoreline verge including the saltmarsh close to Rockfleet Castle for car parking. There has been some disturbance south of the castle from dumping or temporary placement of building aggregates, that have since been removed (422). This area has several eroded patches of saltmarsh. There has been some additional disturbance of this area from old slipway across the intertidal area into the bay (501). Some rubble has been dumped on the shoreline on the rank grassland above the strandline and also on the MSM (422). This area of MSM also has telegraph poles (511). Part of the shoreline in the west part of the bay has been infilled and landscaped (802).

Activities adjacent to the saltmarsh habitats include farming (120, 140), dwellings (403), roads (502) and outdoor leisure activities (620).

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

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
1330	143	A	-1	0.71	Inside
1330	422	C	-2	0.01	Inside
1330	501	C	-1	< 0.1	Inside
1410	511	C	-1	0.01	Inside
1410	802	C	-2	< 0.1	Inside
13s	120	C	0	0.8	Outside
13s	140	C	0	0.8	Outside
13s	403	C	0	0.8	Outside
13s	502	C	0	0.8	Outside
13s	620	C	0	0.8	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.

5 CONSERVATION STATUS

Both habitats are assessed together (Table 5.1). No monitoring stops were carried out at this site because the site was in such a poor condition with many signs of disturbance, and the habitat extent was relatively small. This is a relatively poor example of Annex I saltmarsh habitat. There is no MPSU Conservation plan for the terrestrial habitats in this SAC.

The medium-term prospects for saltmarsh migration at this site are poor. Much of the saltmarsh is situated close to 'hard' landward boundaries (embankments and shoreline road) and there are only small amounts of transitional habitats.

5.1 Overall Conservation Status

5.1.1 Extent

Overall, the extent of both habitats is assessed as *favourable* (Table 5.1). There is no previous information on the extent of saltmarsh at this location. A small patch of shoreline has been infilled and landscaped but this is only a minor area. There is no information to suggest that more significant areas of saltmarsh have been lost in the recent past.

5.1.2 Habitat structure and functions

Overall the structure and functions of the ASM habitat is assessed as *unfavourable-bad*. No monitoring stops were carried out but a visual assessment was made of the overall ASM habitat according to required attributes. The main area of the ASM in the eastern part of the bay is badly disturbed by poaching. Some of the other patches of ASM saltmarsh are also disturbed by dumping and tracks. The ASM habitat has a typical species diversity with one notable absentee being Glasswort (*Salicornia* sp.). Some zonation is present. However the salt pan and creek topography is poor and this is typical of fringe saltmarshes.

The structure and functions of the ASM habitat is assessed as *unfavourable-inadequate.* The small area of this habitat has typical species diversity. However, it is somewhat disturbed by the presence of a telegraph pole and some dumping of rubble.

No Cordgrass (*Spartina anglica*) was recorded at this site.

5.1.3 Future prospects

The future prospects of both these habitats are assessed as *unfavourable-bad*. This assessment assumes that the current management activities and level of impacts continue in the near future. This site is vulnerable to a range of activities due to its proximity to a shoreline road. Cattle poaching is severe in the largest section of ASM and is likely to continue.

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

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

6 MANAGEMENT RECOMMENDATIONS

No recommendations as the site is quite small.

Saltmarsh Monitoring Project

Rockfleet Castle

SMP Code: **SMP0015**

Map produced by: **SMP 2006**

Map Version: **1**

Clew Bay complex cSAC (001482)

0 40 80 120 160 200 Meters

Scale: **1:2943**

N

Appendix VI - Rosharnagh East site report and habitat map from the Saltmarsh Monitoring Project (McCorry, 2007)

1 SITE DETAILS

SMP site name: **Rosharnagh East**		SMP site code: **SMP0016**
Site name (Curtis list): **Rosharnagh East**		CMP site code: **not surveyed**
		Site No: (Curtis list): **77**
NPWS Site Name: **Clew Bay complex**		Dates of site visit: **08/09/2006**
NPWS designation	SAC: **1482**	MPSU Plan: **no plan for terrestrial habitats**
	pNHA: **1482**	
County: **Mayo**		Discovery Map: **31** Grid Ref: **097500, 291770**
6 inch Map No: **Ma076**		Aerial photos (2000 series): **01960-a, 01960-b**

Annex I habitats currently designated for Clew Bay complex SAC:

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

Other SMP sites within this SAC/pNHA:

Mallaranny, Tooreen, Rosmrrevagh, Tierna, Rockfleet Castle, Caraholly South, Kiladangan, Annagh Island, Bartraw

Saltmarsh type: **Bay** Substrate type: **Mud/sand**

2 SITE DESCRIPTION

Rosharnagh East saltmarsh is located on the eastern side of Clew Bay, midway between Westport and Newport in County Mayo. The saltmarsh occurs at the head of the Rossow Channel and only covers a small area. The Rossow Channel contains intertidal mudflats that are stony in places. This channel is one of the narrow long inlets that occur at the eastern end of Clew Bay. There are two peninsulas on either side of the channel that are dominated by wet and dry grassland within fields. The saltmarsh is separated from brackish marsh higher up the valley by a minor road and bridge. A sluice allows flow from the brackish marsh via a drain into the channel at low tide. There is a second small drain flowing into the north side of the saltmarsh. Part of the saltmarsh has been infilled recently.

Two Annex I habitats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM), are found at this site. Only the ASM habitat is listed as a qualifying interest for the Clew Bay Complex SAC. Most of this saltmarsh is outside the SAC boundary. Only a small strip of saltmarsh along the seaward edge occurs within the SAC. This is an unintentional boundary error, as the 1929 shoreline boundary (usually the lower edge of the saltmarsh) was used as

the SAC boundary in this small inlet. Using this boundary has excluded the intertidal saltmarsh habitats (situated landward of this boundary). Using the high water boundary would have included most of the saltmarsh habitat.

The site is easily accessed by following the shoreline where a minor road crosses a bridge.

3 HABITATS

3.1 General description

The saltmarsh contains both Atlantic salt meadows (ASM) (1330) and Mediterranean salt meadows (MSM) (1410) in a mosaic. These habitats are described together as the site is so small and the habitats occur in a mosaic. The MSM is dominant (Table 3.1). The saltmarsh only covers a small area (Table 3.1). The main section is dominated by clumps of Sea Rush (*Juncus maritimus*). These vary in size and intermix with grassy vegetation dominated by Saltmarsh Rush (*Juncus gerardii*), Creeping Bentgrass (*Agrostis stolonifera*) and Red Fescue (*Festuca rubra*) towards the landward side, with occasional Autumn Hawkbit (*Leontodon autumnalis*) and White Clover (*Trifolium repens*). Further down the saltmarsh the ASM patches are dominated by Common Saltmarsh-grass (*Puccinellia maritima*), Sea Aster (*Aster tripolium*), Sea Pink (*Armeria maritima*), Sea Milkwort (*Glaux maritima*), Sea Plantain (*Plantago maritima*) and Common Scurvygrass (*Cochlearia officinalis*). The saltmarsh continues along the shoreline south towards the bridge crossing the embankment. This narrow band has strandline vegetation with Creeping Bentgrass and Spear-leaved Orache (*Atriplex prostrata*). There are several small salt pans on the saltmarsh but there has been no creek development. A fence-line/stone wall crosses the saltmarsh. The landward side is grazed while grazing is absent on the seaward side.

A narrow band of saltmarsh (1-5 m) is also present along parts of the northern side of the Rossow Channel, but was not mapped due to survey time constraints (Table 3.1).

Table 3.1. Area of EU Annex I habitats listed at Rosharnagh East.

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	0.20
1410	Mediterranean salt meadows (Juncetalia maritimi)	0.30
	Total	**0.5***

*note that saltmarsh habitat continues outside the surveyed site.

4 IMPACTS

Part of the saltmarsh has been infilled in the past few years. This is the main impact on saltmarsh at this site (Table 4.1). Infilling with construction waste has occurred in the field

adjacent to the minor road. This was mainly over wet and dry grassland at the landward side and probably extended down onto the saltmarsh.

Part of the site is also grazed, probably by cattle (140). A section of the saltmarsh has been fenced off and is ungrazed.

The saltmarsh has probably been affected in the past by drainage works and the modification of channels to the north and south of the saltmarsh that drain shallow valleys. This old drainage was probably part of attempts at land improvement in the past. Saltmarsh along the northern side of the Rossow Channel has been improved in the past to create agricultural land. There are no signs of erosion in this part of Clew Bay.

Table 4.1. Intensity of various activities on saltmarsh habitats at Rosharnagh East.

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
13s	140	C	0	0.25	Inside
13s	802	A	-2	0.1	Inside

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

5 CONSERVATION STATUS

5.1 Overall Conservation Status

The overall conservation status of the saltmarsh habitats at this site is *unfavourable-bad* (Table 5.1). No monitoring stops were carried out on this site as it was so small. The conservation status is *unfavourable-bad* because of the loss of extent due to infilling. The structure and functions of the remaining saltmarsh are typical of a saltmarsh this size. Plant diversity is typical and the sward height is adequate due to the lack of grazing on part of the site. There are some signs of disturbance, probably connected to the recent infilling and to older activities such as drainage. This site is a poor quality example of both saltmarsh habitats.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Rosharnagh East.

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

6 MANAGEMENT RECOMMENDATIONS

There are no management recommendations for this site as it is too small. The SAC boundary should be modified to include the saltmarsh habitat at this site.

Saltmarsh Monitoring Project

Rosharnagh East

SMP Code: SMP0016

Map produced by: SMP 2006

Map Version: 1

The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government. (Permit number 8953)

Clew Bay complex cSAC (001482)

0 20 40 60 80 Meters

Scale: 1:1227

N

Appendix VII - Caraholly South site report and habitat map from the Saltmarsh Monitoring Project (McCorry, 2007)

1 SITE DETAILS

SMP site name: **Caraholly South**		SMP site code: **SMP0017**
Site name (Curtis list): **Caraholly South**		CMP site code:
		Site No: (Curtis list): **79**
NPWS Site Name: **Clew Bay Complex**		Dates of site visit: **14/07/2006**
NPWS designation	SAC: **1482**	MPSU Plan: **None for coastal areas**
	pNHA: **1482**	
County: **Mayo**		Discovery Map: **31** Grid Ref: **095500, 285440**
6 inch Map No: **Ma087**		Aerial photos (2000 series): **02077-b**

Annex I habitats currently designated for Clew Bay Complex SAC:
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (1330)

Other SMP sites within this SAC/pNHA: **Mallaranny, Tooreen, Rosmurrevagh, Tierna, Rockfleet, Roshanagh East, Annagh Island, Kiladangan, Bartraw**

Saltmarsh type: **Bay**	Substrate type: **Sand**

2 SITE DESCRIPTION

Caraholly South saltmarsh is located along the eastern shoreline of Clew Bay, 3.5 km north-west of Westport in County Mayo. The saltmarsh is adjacent to the site of Bawn Castle (national monument) located in a neighbouring farmyard. The landscape at this location has frequent low-lying small drumlin hills and islands typical of Clew Bay. The shoreline is quite irregular and a small bay (Bawn Strand) has developed between two elevated areas. This is a relatively small saltmarsh site with the widest area being 50 m narrowing to a 5 m wide band along the outer shoreline of the bay. The saltmarsh has developed around the shoreline of Bawn Strand, which is a small intertidal bay facing westwards. Caraholly South is located 7 km south of Rosharnagh East saltmarsh.

The site can be accessed easily by minor roads from Westport. The shoreline has to be accessed by crossing privately-owned land and permission was sought before hand.

One Annex I habitat, Atlantic salt meadows (ASM) is found at this site. This habitat is listed as a qualifying interest for the Clew Bay Complex SAC. Nearly all of the saltmarsh is excluded from the SAC. This is an unintentional boundary error, as the 1929 shoreline boundary (usually the lower edge of the saltmarsh) was used as the SAC boundary in this small inlet. Using this boundary has excluded the intertidal saltmarsh habitats (situated landward of this boundary). Using the high water boundary would have included most of the

saltmarsh habitat and the SAC boundary switches to the high water boundary further along the shoreline. The rectification between the 2000 aerial photo and the 1929 6 inch map is also poor (10 m error).

3 HABITATS

3.1 General description

The only Annex I habitat found at this site is Atlantic Salt Meadows (ASM) (Table 3.1) and this surrounds the bay, varying in width. The saltmarsh develops into a narrow band towards the outer parts of the bay (Hoban's Hill headland) and eventually grades into a cobble/pebble beach shoreline. The outer parts of the saltmarsh are eroded and there are patches of mosaic habitat with saltmarsh and rocky shoreline. A small stream/drain flows into the eastern side of the bay and divides the saltmarsh into two sections (north and south). A small 'island' within the bay also contains ASM. There are eroded saltmarsh cliffs at the seaward edge of the saltmarsh (0.3-1 m high). The northern seaward edge of the saltmarsh is highly fragmented. The bay contains intertidal sand and mudflats at the seaward edge of the saltmarsh. There are some mosaics of rocky/muddy substrates in the intertidal area with large patches of brown algae.

Fences generally mark the landward boundary of the saltmarsh and divide the intertidal shoreline from the terrestrial improved grassland. Some of the fences are built on old stone walls or low stony embankments. Some of the saltmarsh has patches of Twitch (*Elytrigia repens*) -dominated grassland at the landward transition. Some of this could be classed as saltmarsh (CM2) but this plant community is not considered to be part of the ASM Annex I habitat (Glauco-Puccinellietalia maritimae). Twitch-dominated grassland is situated along the strandline and may spread below the high water mark. However, it can spread significantly above the high water mark. Improved grassland in fields surrounds the north and south of the site. The saltmarsh extends eastwards back to the minor road. There is some improved grassland between the road and saltmarsh. Part of the saltmarsh in the south-eastern section, adjacent to the road, has been infilled since the 2000 aerial photo was taken.

Table 3.1. Area of EU Annex I habitats listed at Caraholly South.

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	1.68
	Total	**1.68**

3.2 Atlantic salt meadows (H1330)

This habitat is dominated by mid-upper saltmarsh communities. Some zonation of plant communities is present and this is dependant on elevation. The mid-marsh community is dominated by Sea Pink (*Armeria maritima*) and Sea Plantain (*Plantago maritima*) with

occasional Sea Milkwort (*Glaux maritima*), Sea Arrowgrass (*Triglochin maritimum*), Sea Aster (*Aster tripolium*) and Common Saltmarsh-grass (*Puccinellia maritima*). Higher up the saltmarsh the vegetation is dominated by increasing amounts of Red Fescue (*Festuca rubra*) and Saltmarsh Rush (*Juncus gerardii*) in addition to the other species mentioned above. Greater Sea-spurrey (*Spergularia media*) is also present.

The lower saltmarsh boundary generally contains small tussocks or mounds dominated by Common Saltmarsh-grass. Other species present include frequent Sea Plantain and Sea Aster, and occasional Lax-flowered Sea Lavender (*Limonium humile*), Sea Pink, Glasswort (*Salicornia* sp.) and Greater Sea-spurrey. There are only small amounts of internal zonation around the small salt pans on the marsh. A pioneer zone dominated by Glasswort and/or Common Saltmarsh-grass is absent

The northern side of the saltmarsh contains a series of low ridges. The vegetation on the top of some of the ridges is transitional with species such as Twitch, Silverweed (*Potentilla anserina*) and Curled Dock (*Rumex crispus*). Upper saltmarsh vegetation dominated by Red Fescue (*Agrostis stolonifera*) and bands of Creeping Bentgrass lie behind these transitional ridges. Several clumps of Sea Rush (*Juncus maritimus*) are present along the northern side of the saltmarsh in the upper saltmarsh. However, these were too small and scattered to be mapped as Mediterranean salt meadows.

A small island in the bay contains saltmarsh. An eroded saltmarsh cliff is present around the edges of the island (0.5-1 m high). This island has salt pans that contain pebbles. The vegetation is dominated by the mid-marsh Sea Pink and Sea Plantain plant community. Other species include Sea Aster, Glasswort, Common Sea-blite (*Suaeda maritima*), Lax-flowered Sea Lavender (*Limonium humile*), Sea Arrowgrass, Sea Milkwort and Common Saltmarsh-grass. There is some plant zonation present with a fringe of Common Saltmarsh-grass and Lax-flowered Sea Lavender around the edges. A higher ridge on the island contains vegetation dominated by Red Fescue. Small clumps of Sea Rush are present. This saltmarsh is ungrazed and the sward height is 0.2-0.4 m high.

The narrow band of saltmarsh located along the outer northern and southern boundaries eventually grades into a shingle/pebble bank. This is vegetated by Common Sea-blite and Spear-leaved Orache (*Atriplex prostrata*). This is not classified as saltmarsh vegetation as the substrate is rocky. The saltmarsh is represented by a narrow band of Common Saltmarsh-grass with frequent Sea Plantain and Lax-flowered Sea Lavender. Orache sp. is present along the upper boundary as the saltmarsh transitions to a band of pebbles/cobbles between the saltmarsh and the terrestrial vegetation on the bank.

The saltmarsh topography is poorly developed and this is due to the small size of the site. There are few creeks draining the saltmarsh, although small pans are frequent in places. Some of the pans are quite deep and this may be related to poaching in the past. The seaward edge of the saltmarsh is relatively badly eroded in places. This may be poaching induced. The saltmarsh cliff varies in height between 0.3-1 m high. There are some sections

where saltmarsh has re-established at the base of the saltmarsh cliff. There are no signs from a comparison of the aerial photo and the GPS points that saltmarsh extent has been reduced.

The northern side of the saltmarsh is currently not grazed significantly. However, there are signs of severe poaching particularly along the seaward edge and in the lower saltmarsh zone. The sward height varies between 5-30 cm and plant sizes are typical. This indicates that sheep are not grazed on this site and grazing is by cattle, although none were present on the site during the survey. The poaching has exposed small amounts of bare substrate in places (1-5%). This increases to 10% in some heavily damaged areas. The southern saltmarsh is grazed.

4 IMPACTS AND ACTIVITIES

There are several different activities on this site (Table 4.1) but the main activity is cattle grazing. The activity codes used in Table 4.1 are given in brackets in the following text. Cattle were not present on the site at the time of the site visit and the sward height indicated that there had been some time since the site was grazed (perhaps 1 month). The sward height was generally between 5 and 30 cm but the grazing has caused poaching (143). This has caused damage in the past and the erosion along the seaward edge looks to be poaching induced. Poaching along the southern side is minor.

A small amount of the saltmarsh (< 0.05 ha) has been infilled recently (800). Most of the infilling has been carried out on the adjacent improved grassland. Telegraph poles cross the bay (Bawn Strand) with one pole present on saltmarsh (511). Some of the saltmarsh seems to be disturbed in the past with one drain/creek being infilled (803). Tracks leading from an adjacent fields cross the saltmarsh and access the shoreline (501).

Activities adjacent to the site include farming, with improved grassland dominating the surrounding areas (120, 140). There is a minor road (502) close to the edge of the saltmarsh and bay, and several houses are scattered in the area around the bay (403). The site was also used for equestrian leisure activities with several horse riders accessing the intertidal mud and sandflats to exercise horses (622).

Table 4.1. Intensity of various activities on saltmarsh habitats at Caraholly South.

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
1330	140	C	0	1.68	Inside
1330	143	B	-1	0.5	Inside
1330	501	C	-1	< 0.1	Inside
1330	511	C	-1	< 0.01	Inside
1330	800	C	-1	0.05	Inside
1330	120	C	0	1.68	Outside
1330	140	C	0	1.68	Outside
1330	403	C	0	1.68	Outside
1330	502	C	0	1.68	Outside
1330	602	C	0	< 0.01	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.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

Overall, this site has an *unfavourable-inadequate* conservation status (5.1). Most of the saltmarsh has been damaged light-moderately by cattle poaching with some heavily damaged localised areas. A small area has been infilled recently. The overall conservation status is assessed as unfavourable-bad as most of the saltmarsh habitat is excluded from the adjacent SAC. This is likely to affect the future prospects of the site and the site may be vulnerable to further infilling in the future.

A comparison of the 2000 aerial photo to the 1929 6 inch map indicates that this site is relatively stable and there has not been much accretion or erosion during this period. There are signs of erosion and accretion around the seaward edge of the saltmarsh, but has not affected extent significantly.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are poor-moderate. The southern side of the bay is adjoined by moderately sloping land close to the edge of saltmarsh and the prospects for migration are poor. However, the land to the north and east of the bay is lower-lying and a moderate sea-level rise will inundate some of this area depending on the topography.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Caraholly South.

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

5.2 Atlantic salt meadows (H1330)

5.2.1 Extent

Overall, the extent of this habitat is assessed as *favourable* in the absence of other information on the previous extent of this habitat. Even though there are signs of erosion along the seaward edge, there are no indications of any loss of habitat due to erosion at this location. There has been some accretion and subsequent saltmarsh growth along part of the saltmarsh cliff on the site. Some of the saltmarsh is likely to have been destroyed by infilling of construction waste. However, the area affected is likely to be less than 3% of the total saltmarsh extent.

5.2.2 Habitat structure and functions

The structure and functions of the ASM area assessed as *unfavourable-inadequate*. Four monitoring stops were carried out on this site and three passed and reached all their targets. Stop 2 failed due to significant erosion close to the saltmarsh edge. This erosion is likely to be poaching-induced. Most of the saltmarsh is affected by poaching to some extent (low-moderate levels) but the damage caused was not significant enough or created significant amounts of bare substrate to fail the other stops. Stop 2 is typical of the damage along much of the saltmarsh edge but the heavily damaged areas do not dominate and this stop is representative of the level and extent of the damage. The other attributes reached all their targets. The species diversity was typical of this habitat and several plant communities were present with zonation dependant on elevation. The pioneer and lower saltmarsh communities were more limited compared to other sites. This can be related to the erosion and damage along the seaward edge. There are relatively few creeks present on this site but this can be related to the relatively small size of the saltmarsh habitat. Some of the salt pans have also been damaged by poaching.

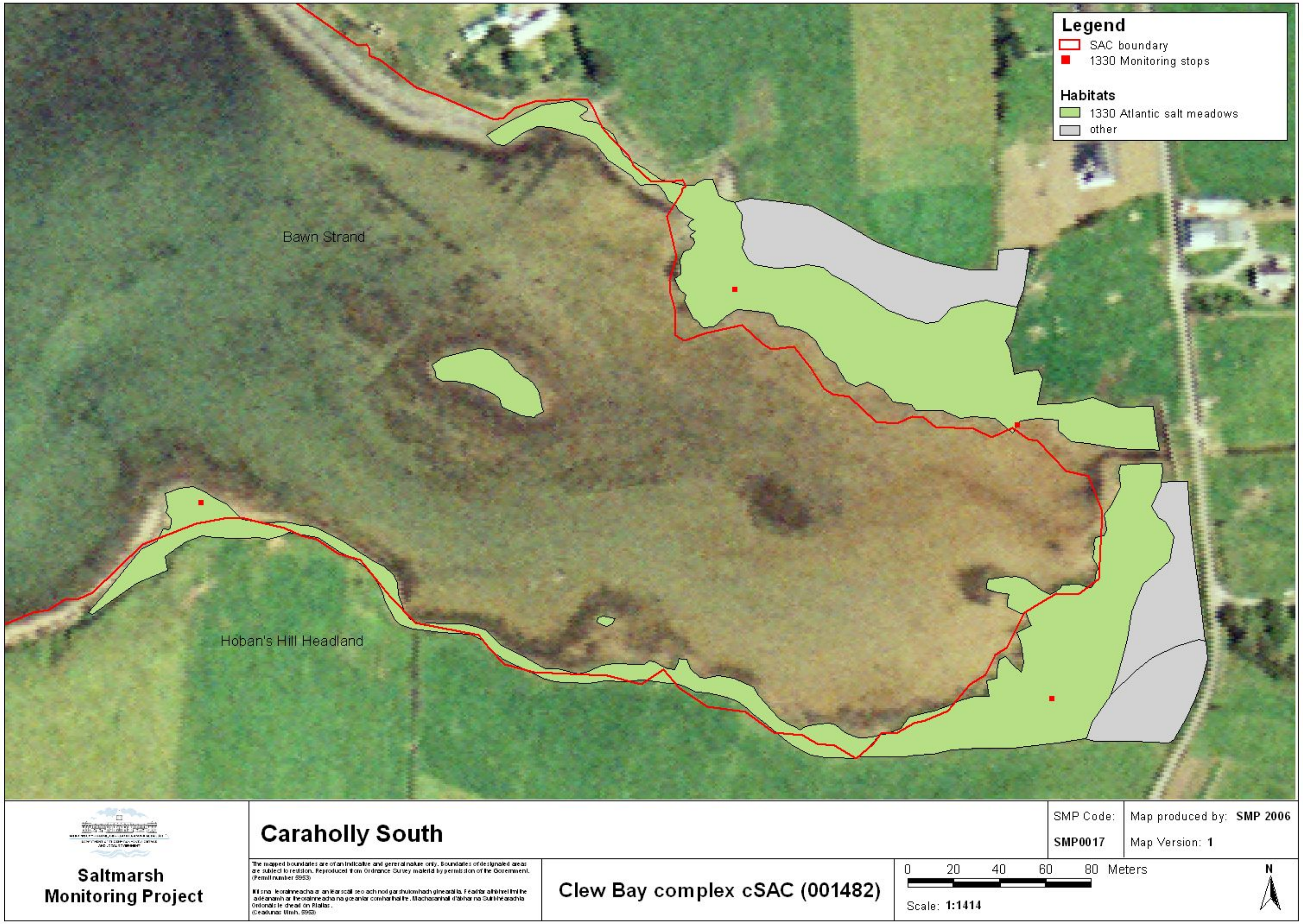
5.2.3 Future prospects

The future prospects of this habitat are assessed as *unfavourable-inadequate*. This assessment is based on the fact that most of the saltmarsh habitat is excluded from the SAC and is therefore not protected from activities such as infilling. This assessment also assumes

that the current management activities and level of impacts continue in the near future. Cattle grazing, although the intensity is low-moderate, is causing some poaching-induced erosion. There is no conservation plan available for the coastal habitats in this SAC.

6 MANAGEMENT RECOMMENDATIONS

There are no management recommendations as most of the site is outside the SAC. A boundary change is required to protect the Annex I habitat present at this site.


Legend
SAC boundary
1330 Monitoring stops
Habitats
1330 Atlantic salt meadows
other
Bawn Strand
Hoban's Hill Headland
Caraholly South
SMP Code:
SMP0017
Map produced by: SMP 2006
Map Version: 1
Saltmarsh Monitoring Project
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government. (Permit number 5953)
Clew Bay complex cSAC (001482)
0 20 40 60 80 Meters
Scale: 1:1414
N

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

1 SITE DETAILS

SMP site name: **Kiladangan**		SMP site code: **SMP0018**
Site name (Curtis list): **Kiladangan**		CMP site code: **not surveyed**
		Site No: (Curtis list): **80**
NPWS Site Name: **Clew Bay complex**		Dates of site visit: **11/07/2006**
NPWS designation	SAC: **1482**	MPSU Plan: **none for coastal areas**
	pNHA: **1482**	
County: **Mayo**	Discovery Map: **31**	Grid Ref: **094220, 282480**
6 inch Map No: **Ma087**	Aerial photos (2000 series): **02139-a, 02139-b**	

Annex I habitats currently designated for Clew Bay Complex SAC:
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (1330)

Other SMP sites within this SAC/pNHA: **Mallaranny, Tooreen, Rosmurrevagh, Tierna, Rockfleet, Roshanagh East, Caraholly South, Annagh Island, Bartraw**

Saltmarsh type: **Sandflats** Substrate type: **Peat/sand**

2 SITE DESCRIPTION

Kiladangan saltmarsh is located in the south-east part of Clew Bay, 5 km west of Westport in Co. Mayo. This site is situated at the base of the Croagh Patrick foothills. This area is also known as Gortbraud and is the location of standing stones and several other features of archaeological importance. These standing stones date back to the late Bronze Age. The landscape at this location has frequent small drumlin hills and islands typical of Clew Bay. The mainland has moderate to steep slopes leading to the foothills of Croagh Patrick. The saltmarsh has developed behind a shingle/pebble bar and is located adjacent to the main Westport-Louisbergh road. Kiladangan is located adjacent to Annagh Island saltmarsh (to the north). This is part of the same coastal system as the shingle/pebble bar extends out into Clew Bay and Annagh Island has developed behind this bar. Bartraw saltmarsh is also situated 3.8 km to the west of Kiladangan.

Two Annex I habitats, Atlantic salt meadow (ASM) and Mediterranean salt meadow (MSM) are found at this site. Only ASM is listed as a qualifying interest for the Clew Bay Complex SAC. The entire saltmarsh habitat is situated within the SAC.

The site is easily accessed from the main Westport-Louisburg Road.

3 HABITATS

3.1 General description

The saltmarsh has formed behind a shingle/pebble ridge in a sheltered area, forming a triangle-shaped marsh with the mainland. The site is moderate in size being 0.35 km long and 0.2 km wide. This saltmarsh is quite uniform and is dominated by Mediterranean salt meadow (MSM) (Table 3.1). Atlantic salt meadow (ASM) patches are situated around the edge of the marsh in narrow bands. These strips are discontinuous and MSM occasionally extends to the saltmarsh edge. Tall saltmarsh cliffs mark the seaward boundaries. Common Cordgrass (*Spartina anglica*) is present at this site but only forms small clumps in conjunction with the other vegetation. This is only one of three sites in Clew Bay with Common Cordgrass. The pebble bank at the western side has also enclosed a large pool at the northern end between the bank and the saltmarsh and a small inlet allows the tide to flow into the pool.

The back of the saltmarsh is marked by a hard embankment along the Westport-Louisburgh Road. There is very little transitional vegetation along this boundary apart from occasional clumps of Sea Club-Rush (*Bolboschoenus maritimus*). A small patch in this area contains transitional and terrestrial habitats as the elevation of this area is slightly raised above the high water mark. The terrestrial area on the western side contains some dry coastal grassland and scrub on a small mound. There is a transitional area between the saltmarsh and the terrestrial section. This transitional area contains small mounds containing species such as Birdsfoot (*Lotus corniculatus*) amongst the upper saltmarsh vegetation dominated by Creeping Bentgrass (*Agrostis stolonifera*), Saltmarsh Rush (*Juncus gerardii*) and Red Fescue (*Festuca rubra*) that occupies the shallow hollows. Saltmarsh vegetation dominates this section with the small terrestrial mounds covering 25% of the area.

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

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	0.86[1]
1410	Mediterranean salt meadows (Juncetalia maritimi)	4.57
	Total	**5.44**

[1]note that this value contain 75% of the (1330/transitional grassland habitat. .

3.2 Atlantic salt meadows (H1330)

This habitat only covers minor areas of the saltmarsh around the seaward edge and is also present in the transitional area towards the eastern side between the mound and the saltmarsh. The vegetation around the edges of the saltmarsh is dominated by Sea Pink (*Armeria maritima*) and Sea Plantain (*Plantago maritima*) with frequent Saltmarsh Rush and occasional Common Saltmarsh-grass (*Puccinellia martima*), Lax-flowered Sea Lavender (*Limonium humile*) and Sea Arrowgrass (*Triglochin maritimum*). Sea Rush (*Juncus maritimus*) is spreading into the ASM vegetation from the Sea Rush-dominated areas. These

areas are grazed lightly-moderately. There are small amounts of bare mud/peat exposed by poaching. The saltmarsh cliffs around the edge of the marsh and edges of some of the pans show sings of erosion. Some of the erosion may be poaching induced. There are several pans within some of the lager ASM areas.

The vegetation in the transition area to the east of the saltmarsh is dominated by Red Fescue and Sea Plantain, with small amounts of Sea Milkwort (*Glaux maritima*), Saltmarsh Rush, Bucks'horn Plantain (*Plantago coronopus*), Autumn Hawkbit (*Leontodon autumnalis*), Creeping Bentgrass and White Clover (*Trifolium repens*). There are occasional low raised mounds with species such as Birdsfoot and Curled Dock (*Rumex crispus*).

3.3 Mediterranean salt meadows (H1410)

This saltmarsh is dominated by Sea Rush, which generally forms dense swards. Other frequent species are Saltmarsh Rush, Sea Milkwort, Sea Plantain and Red Fescue. Species such as Sea Aster (*Aster tripolium*), Sea Pink, Creeping Bentgrass, Lax-flowered Sea Lavender, Common Saltmarsh-grass, Sea Arrowgrass, Long-bracted Sedge (*Carex extensa*) and Autumn Hawkbit are occasional or rarely present. Plant community zonation within the MSM is poor but this is typical of a habitat defined by the presence of Sea Rush only. There is some minor zonation along the edges of creeks and pans with Common Saltmarsh-grass, Lax-flowered Sea Lavender, Annual Sea-Blite (*Suaeda maritima*) and Glasswort (*Salicornia* sp.) appearing. There are small patches of ASM vegetation dominated by Sea Pink and Sea Plantain within the MSM mapped area. There are several clumps of Common Cordgrass present within the MSM, generally growing in salt pans. The vegetation is generally in good condition and grazing levels are low. There is some minor poaching but this is generally localised in the areas without Sea Rush (the ASM) or along creeks and pans.

The saltmarsh has a well developed creek and salt pan topography. One of the creeks has been canalised and is developing into a long drain along the pebble bank. Salt pans are scattered over the saltmarsh. Shoreweed (*Littorella uniflora*) is present in some pans at the back of the marsh.

4 IMPACTS AND ACTIVITIES

The main activity on Kiladangan saltmarsh is grazing (140). Several cattle and a larger flock of sheep are both present. The sheep move to Annagh Island along the shingle bar. The grazing level is generally low as much of the saltmarsh is Sea Rush dominated and this shields the other species somewhat. There is some heavy poaching at localised areas, particularly along the creeks and the ASM areas within the MSM (142). However, the area of saltmarsh badly damaged by poaching is minor. A water trough is also present on the saltmarsh for the livestock. An old enclosure on the eastern side now contains scrub. The saltmarsh is the site of standing stones and other archaeological features dating to the Bronze Age. These attract tourists and visitors.

One of the old creeks adjacent to the shingle bar has been canalised and straightened. This drain pre-dates the 1930 6 inch map.

Activities adjacent to the saltmarsh habitats include farming (120, 140), dwellings (403) and roads (502). A track across the shingle/pebble bank allows access to Annagh Island (502).

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

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
13s	140	C	0	5.44	Inside
1330	142	A	-1	0.1	Inside
13s	120	C	0	5.44	Outside
13s	140	C	0	5.44	Outside
13s	403	C	0	5.44	Outside
13s	502	C	0	5.44	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.
[3] Intensity of the influence of an activity is rated as A = high, B = medium, C = low influence and D unknown.
[4] Impact is rated as –2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1= natural positive influence and +2 = strongly managed positive influence.
[5] Location of activity: Inside = activities recorded within and directly impacting the saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

Overall, this site has a good or favourable conservation status (Table 5.1). The MSM, which dominates the site, is in good condition. Grazing is the main activity. Only minor areas are damaged by poaching. The ASM has an unfavourable conservation status, but this only covers a minor area in comparison to the MSM (< 15%) so the damaged areas have a more significant impact on the conservation status assessment.

Common Cordgrass is present on the site but only several isolated clumps are present and these don't cover a significant area. Common Cordgrass is an invasive species. Common Cordgrass was planted in Clew Bay in the vicinity of Westport House between 1929 and1932 (Praeger 1932), where it was reported that many plants died. Nairn (1986) noted that there was only one clump present in Clew Bay near Westport House. The most extensive area of Common Cordgrass is on Annagh Island adjacent to this site. Annagh Island is a likely source of the Common Cordgrass on this site. However, Common Cordgrass is unlikely to become extensive at this site under current conditions. The saltmarsh is dominated by MSM, a plant community that favours the upper marsh. Common Cordgrass favours the pioneer and the lower saltmarsh zones so it is unlikely to spread significantly as it would be uncompetitive compared to the Sea Rush and other species. There may be some more spread of Common Cordgrass within salt pans, along creeks and bare mud at the site. If current conditions favoured Common Cordgrass spread it is likely to have already happened considering the time it has been present.

Changes in the conditions on the site may favour further spread of Common Cordgrass. These include a significant increase in poaching and grazing and sea level rise inducing erosion. Both of these impacts would lead to the vegetation being damaged and bare sediment being produced. The bare sediment areas would favour pioneer species such as Common Cordgrass.

A comparison of the 2000 aerial photo to the 1929 6 inch map indicates that this site is relatively stable and there has not been much accretion or erosion during this period. Some erosion noted along the edges of some of the salt pans and the large pool is likely to be poaching induced (ASM stop 2).

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are poor. This saltmarsh is constrained by a 'hard' landward boundary with an embankment protecting the main Westport-Louisburgh road. This site is likely to be eroded in response to sea-level rise although initially the shingle/pebble bank will offer some protection.

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

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

5.2 Atlantic salt meadows (H1330)

5.2.1 Extent

Overall, the extent of this habitat is assessed as *favourable* in the absence of other information on the previous extent of this habitat. There are some signs of erosion along the edges of some of the salt pans and the large pool adjacent to this habitat. However, there are no indications that significant areas of saltmarsh have been eroded away due to this damage.

5.2.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-bad*. Two monitoring stops were carried out in this habitat with one passing and one failing. It was decided that two stops represented the ASM adequately as it covered a small area and these two stops reflect the relative damage. The species diversity at this site was typical of this

habitat and several different saltmarsh plant communities were present, with zonation dependant on elevation. There is some lower saltmarsh zone vegetation along the edges of the creeks and salt pans within the saltmarsh but overall the ASM is dominated by mid-upper zone vegetation. The ASM is grazed but not excessively by sheep and cattle. However, cattle are poaching parts of the saltmarsh surface. Some salt pans are present in some of the larger ASM areas. Clumps of Common Cordgrass are present in this habitat but this species is not likely to have significant impact on the structure and functions of this habitat.

The conservation status is enhanced due to the presence of a transitional area dominated by ASM between the saltmarsh and the low hill in the north-east section. This area contains a mixture of terrestrial and saltmarsh species in a slightly elevated area between the two zones.

5.2.3 Future prospects

The future prospects of this habitat are assessed as *unfavourable-bad*. This assessment assumes that the current management activities and level of impacts continue in the near future. There is some damage from cattle poaching and this is likely to continue in the future. There is no conservation plan available for the coastal habitats in this SAC.

5.3 Mediterranean salt meadows (H1410)

5.3.1 Extent

Overall, the extent of this habitat is assessed as *favourable* in the absence of other information on the previous extent of this habitat. There are no signs of erosion at this location.

5.3.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. Four monitoring stops were carried out in this habitat and all passed. Overall, the species diversity is typical for this habitat. There are several other typical indicators of good structure and function present including well-developed creeks and pans and internal zonation of vegetation communities along the creeks. The MSM is grazed but the intensity is quite low as the dense Sea Rush tends to shield the other species. The small ASM patches within the MSM tend to be targeted by the cattle. Clumps of Common Cordgrass are present in this habitat but this species is not likely to have significant impact on the structure and functions of this habitat. The presence of this species actually enhances the species diversity and the sward structure of the saltmarsh.

5.3.3 Future prospects

The future prospects of this habitat are assessed as *favourable*. This assessment assumes that the current management activities and level of impacts continue in the near future. There is no conservation plan available for the coastal habitats in this SAC.

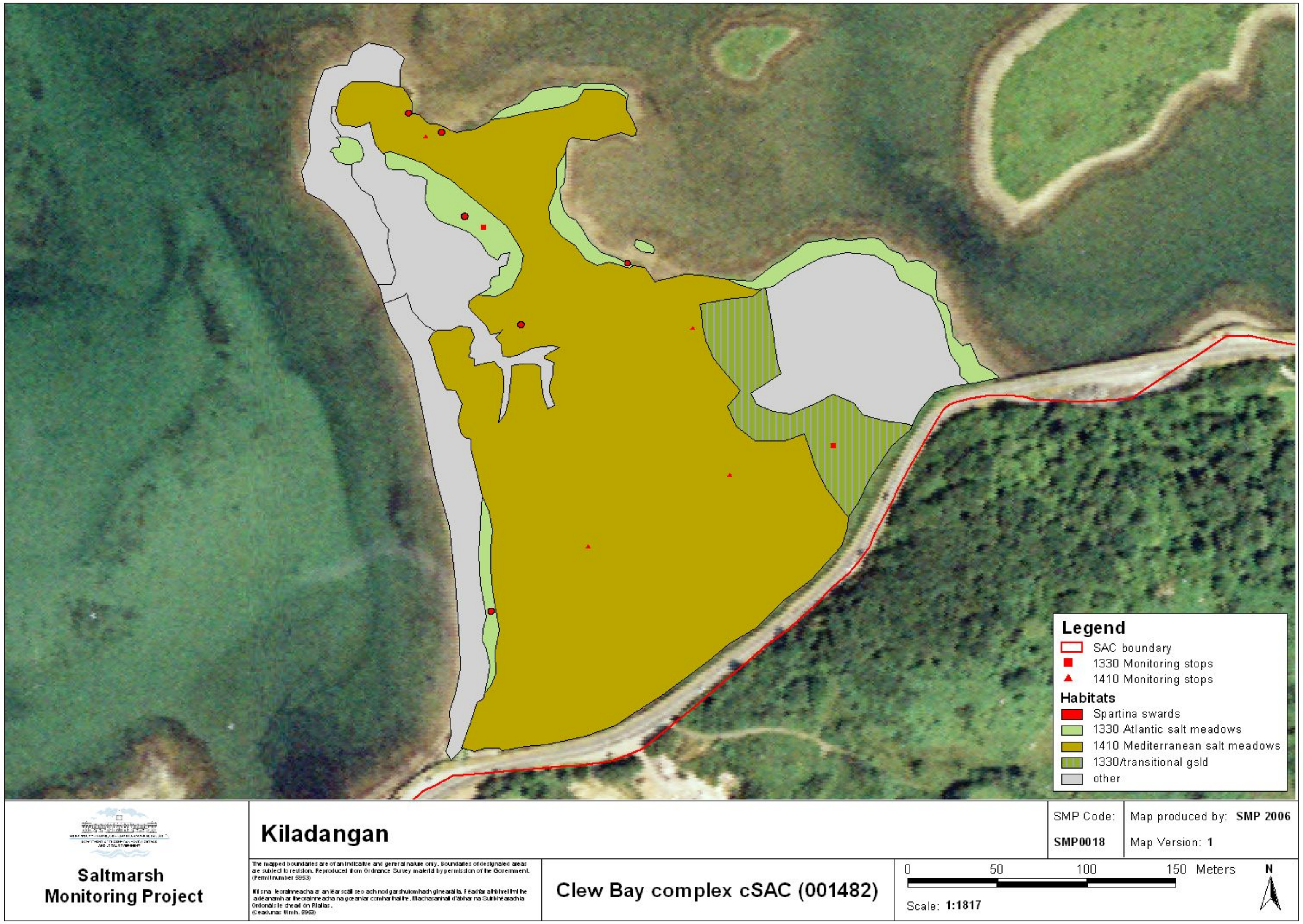
6 MANAGEMENT RECOMMENDATIONS

The current grazing and stocking levels should be maintained and they are not having an overall negative impact on the site.

7 REFERENCES

Nairn, R.G.W. (1986). *Spartina anglica* in Ireland and its potential impact on wildfowl and waders - a review. *Irish Birds*, 3, 215-258.

Praeger, R.L. (1932). Some noteworthy plants found in or reported from Ireland. *Proceedings of the Royal Irish Academy*, 41B, 95-124.



Legend
SAC boundary
1330 Monitoring stops
1410 Monitoring stops
Habitats
Spartina swards
1330 Atlantic salt meadows
1410 Mediterranean salt meadows
1330/transitional gsld
other
Saltmarsh Monitoring Project
Kiladangan
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision. Reproduced from Ordnance Survey material by permission of the Government. (Permit number 5953)
Níl sna teorainneacha ar an léarscáil seo ach nod garshuíomhach ginearálta. Féadfar athbhreithniú a dhéanamh ar theorainneacha na gceantar comharthaithe. Macasamhail d'ábhar na Suirbhéarachta Ordanáis le cead ón Rialtas. (Ceadúnas Uimh. 5953)
Clew Bay complex cSAC (001482)
SMP Code:
SMP0018
Map produced by: SMP 2006
Map Version: 1
0 50 100 150 Meters
Scale: 1:1817
N

Appendix IX - Annagh Island site report and habitat map from the Saltmarsh Monitoring Project (McCorry, 2007)

1 SITE DETAILS

SMP site name: **Annagh Island**		SMP site code: **SMP0019**
Site name (Curtis list): **not listed**		CMP site code:
		Site No: (Curtis list): **not on list**
NPWS Site Name: **Clew Bay complex**		Dates of site visit **11/07/2006**
NPWS designation	SAC: **1482**	MPSU Plan: **none for coastal areas**
	pNHA: **1482**	
County: **Mayo**		Discovery Map: **31** Grid Ref: **094970, 283650**
6 inch Map No: **Ma087**		Aerial photos (2000 series): **02077-c, 02077-d, 02139-a, 02139-b**

Annex I habitats currently designated for Clew Bay complex SAC:
Atlantic salt meadows (Glauco-Puccinellietalia maritimae) (1330)

Other SMP sites within this SAC/pNHA:
Mallaranny, Tooreen, Rosmurrevagh, Tierna, Rockfleet, Roshanagh East, Caraholly South, Kiladangan, Bartraw

Saltmarsh type: **Sandflats** Substrate type: **Sand/peat/mud**

2 SITE DESCRIPTION

Annagh Island saltmarsh is located in the south-east part of Clew Bay, 5 km west of Westport in Co. Mayo. This site is situated at the base of the Croagh Patrick foothills. The landscape at this location has frequent small drumlin hills and islands typical of Clew Bay. Annagh Island is located adjacent to Kiladangan (to the south) and is an extension of the same coastal shingle/pebble bar. Annagh Island is mainly low-lying, has a complex shape and is a complex system of coastal habitats. The shingle/pebble/cobble beach and bank (Sruffonboun Strand) is situated along the western side of the island, facing the opening of Clew Bay. The bank is curved like a sickle and several wider areas of terrestrial and saltmarsh habitats have developed behind the pebble/cobble bank. These larger areas (Annagh East, Annagh Middle and Annagh West) are connected with narrow banks. Several low hills on the island contain dry coastal grassland and some patches of scrub. There are several enclosures on the island and it was inhabited in the past. Old Lazy beds were noted on coastal grassland and also on the higher saltmarsh zone at one location. Several small pools and one larger lagoon (Annagh Lough) are also present on the island. The lower-lying land transitions from dry coastal grassland to saltmarsh below the high water mark and there are several small intertidal bays seaward of the saltmarsh containing sandflats/mudflats and rocky deposits. Bartraw saltmarsh is also situated 3.8 km to the west of Annagh Island.

Three Annex I habitats, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM), are found at this site. Only one, ASM, is listed as a qualifying interest for the Clew Bay Complex SAC. A *Spartina* sward is also present at this site. The entire saltmarsh area is situated within the SAC.

The site can be accessed from the main Westport-Louisburgh Road via Kiladangan saltmarsh and a track across the shingle/pebble bank. Annagh Island can only be visited at low tide as there is a water channel dividing the shingle/pebble bank between the two sites.

3 HABITATS

3.1 General description

The saltmarsh habitats have developed in low-lying areas and small sheltered bays and inlets between the elevated areas. Some of the site has a complicated topography with a complex network of low mounds, shallow depressions and several pools or tidal inlets overlaying glacial deposits. The saltmarsh at this site is likely to have a complex ontological development. The largest areas of MSM have developed on peat deposits while the ASM generally is present on shallower sandier/muddy deposits. There are similar amounts of ASM and MSM (Table 3.1). ASM is most frequent in these areas forming strips of saltmarsh around pools and mounds, following the topography. Strips of narrow ASM are also present along the steeper sloping shorelines. Patches of MSM are scattered over the site with the largest section being on Annagh Island West. The largest patch of saltmarsh is situated on Annagh Island East. This is a large mosaic area of saltmarsh dominated by MSM (75%) with a smaller area of ASM (25%). A small area of *Spartina* sward is situated on Annagh Island East (Table 3.1). There is also a small patch of *Salicornia* flats (1310) located at the south-east part of Annagh Island West.

The saltmarsh generally transitions to dry acid grassland or dry grassland with a coastal influence (some fixed dune indicators are present). This acid grassland is generally dominated by Fescue spp. (*Festuca* spp.), Bentgrass spp. (*Agrostis* spp.) and White Clover (*Trifolium repens*) with occasional Yorkshire Fog (*Holcus lanatus*) and Sweet Vernal-grass (*Anthoxanthum odoratum*). In some areas there is a very gradual transition as the slope is shallow and the boundary between ASM and terrestrial grassland is sometimes not distinct. Sometimes this is complicated by a complex system of low hummocks containing coastal grassland and hollows containing saltmarsh. Both habitats are heavily grazed with close-cropped swards. Some of the mounds contain Gorse (*Ulex europaeus*) -dominated scrub. Plant litter sometimes marks the strandline. Saltmarsh transitions to the shingle/pebble/cobble in places along the bank on the western boundary. Pebbles and cobbles are occasionally found on both saltmarsh habitats (blown over from the shingle/pebble/cobble barrier). The seaward boundaries of the saltmarsh are generally low saltmarsh cliffs. Below these low cliffs there are bands of rocky/muddy substrates that

gradually transition into intertidal mud and sandflats. Occasionally there are patches of Annual Sea-blite (*Suaeda maritima*) and Orache sp. (*Atriplex* sp.) colonising the pebbly banks (but these areas are not classified as saltmarsh).

Table 3.1. Area of EU Annex I habitats listed at Annagh Island.

EU Code	Habitat	Area (ha)
1310	*Salicornia* and other annuals colonizing mud and sand (1310)	0.01
	Spartina sward	0.33
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	4.45 [1]
1410	Mediterranean salt meadows (Juncetalia maritimi)	4.46 [1]
	Total (not including *Spartina* sward)	**8.92**

[1] total includes 50% of the 1330/1410 mosaic

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

A very small patch of this habitat was present on the site. This was located at the south-west end of the island on the shingle/pebble bank separating Annagh Island from Kiladangan. The small patch has developed on the east side of the shingle/pebble bank (at the back of the bank). Glasswort (*Salicornia* sp.*)* and Annual Sea-blite appear together on a gravely/muddy substrate. This habitat does not appear elsewhere on the site although there are intertidal areas of sediment that would be suitable for this habitat.

This habitat also is also present elsewhere on the site, although it was too small to be mapped. There are small bands of Glasswort and Annual Sea-blite on accreted mud along some of the creeks mainly within the MSM. There is generally no Glasswort in the pans of the ASM.

3.3 *Spartina* swards

This site contains a small area of *Spartina* sward. This sward was the only Common Cordgrass (*Spartina anglica*) recorded on the site although several clumps are situated on Kiladangan situated adjacent to this site. The sward is the only uniform area of Common Cordgrass found in Clew Bay. Several large clumps are also present in Westport Quay (Grid Refs. 098251, 284864), the only other site with Common Cordgrass in Clew Bay. Common Cordgrass was planted in Clew Bay in the vicinity of Westport House between 1929-1932 (Praeger 1932) where it was reported that many plants died. Nairn (1986) noted that there was only one clump present in Clew Bay near Westport House. The sward has colonised soft mud on intertidal flats in a small inlet. Common Cordgrass has formed a dense sward on the mud and there are few other saltmarsh species present. Some Common Saltmarsh-grass (*Puccinellia maritima*) and Glasswort are occasional along the edges of the *Spartina* sward. Common Cordgrass was heavily grazed creating a closely cropped sward 5-10 cm high. This is unusual and gives an indication of the high grazing pressure on the island.

Common Cordgrass has only colonised the soft intertidal mudflats and has not spread into the adjacent ASM and MSM saltmarsh. There is a distinctive boundary between the *Spartina*

sward and the MSM sward, with a low saltmarsh cliff marking the edge of the MSM. There were very few seedlings at the seaward edge of the Common Cordgrass and few small isolated clumps. This indicates that the rate of spread is quite slow.

3.4 Atlantic salt meadows (H1330)

This habitat is found on each of the three sub-islands. It is generally heavily grazed by sheep and forms a characteristic low sward. In some areas it is overgrazed and the grazing pressure in conjunction with trampling and poaching is stripping the vegetation from the sediment surface leaving 5-10% bare substrate. Some of the larger ASM areas have a complex mound/hollow and creek/pan topography creating complex zonation of vegetation communities according to elevation. A narrow band of ASM is also present along some of the steeper sloped shorelines with a band of saltmarsh < 5 m wide.

Saltmarsh Rush (*Juncus gerardii*) and Red Fescue (*Festuca rubra*) dominate the upper saltmarsh patches at the tops of the mounds. Others species present include Long-bracted Sedge (*Carex extensa*), Greater Sea Spurrey (*Spergularia media*) and Common Scurvy-grass (*Cochlearia officinalis*). Occasional clumps of Sea-Rush are present although they cover only 1-5% of the ASM area. The larger clumps of Sea Rush (*Juncus maritimus*) are mapped as ASM. Long-bracted Sedge is particularly prevalent in the gradual transition from low-lying coastal grassland to ASM. This upper zone does not seem to be as damaged as the lower saltmarsh zones and the bare substrate cover is < 1%. The sward height is generally quite low (2 cm high) and quite uniform.

Generally the most abundant plant community is the middle marsh community dominated by Sea Pink (*Armeria maritima*) and Sea Plantain (*Plantago maritima*). Other species present include Red Fescue, Saltmarsh Rush, Common Saltmarsh-grass, Glasswort and Sea Milkwort (*Glaux maritima*). This community generally has developed on sandy/muddy substrate. This community also appears to be most vulnerable to the overall damage by the heavy grazing pressure. Grazing has created a very low close-cropped sward (1 cm high) and individual plants are relatively small compared to other sites with less grazing. There may also be an element of natural wind erosion but overgrazing and poaching is exacerbated the damage to the sward cover. Some areas have up to 10-15% bare substrate cover. The grazing has probably affected species diversity in places compared to this community at other locations. Sea Plantain and Sea Pink are quite dominant.

The lower saltmarsh zone is not very extensive. Long strips dominated by Common Saltmarsh-grass and containing Glasswort and Annual Sea-blite are situated along the lower boundary of the creeks and pans with internal saltmarsh zonation. However this community does not cover large patches of saltmarsh. Common Cordgrass is not present in this habitat.

Common Saltmarsh-grass and Glasswort are both present in some of the narrow saltmarsh strips along the steeper sloped shorelines. However, these strips are generally not

dominated by any one species and are more typical of fringe type saltmarshes with Saltmarsh Rush, Sea Plantain, Sea Pink and Common Saltmarsh Grass are appearing together.

The pan and creek topography is well developed in the larger sections although the creeks are quite small. There is generally no Glasswort in pans, which contain bare mud. There are some larger creeks in the larger saltmarsh areas dominated by MSM.

3.5 Mediterranean salt meadows (H1410)

This habitat is present in several areas on the site and dominates some of the largest saltmarsh areas. The MSM is characterised by a dense sward of Sea Rush. Clumps or large areas of Sea Rush may form mosaics with ASM vegetation. Where the ASM area within the MSM was greater than 10%, the whole saltmarsh area was mapped as a mosaic. The mosaic areas also have occasional patches of coastal grassland within the saltmarsh area on some low mounds that are slightly above the high water mark.

Other species found amongst the Sea Rush include Sea Milkwort, Red Fescue, Sea Pink, Sea Plantain, Sea Arrowgrass (*Triglochin maritimum*), Creeping Bentgrass (*Agrostis stolonifera*) and Spear-leaved Orache (*Atriplex prostrata*). Species such as Autumn Hawkbit (*Leontodon autumnalis*) and White Clover appear towards the upper saltmarsh boundary. Sea Rush sometimes spreads above the high water mark at the landward boundaries. Species such as Birdsfoot, Sweet Vernal-grass and Yorkshire Fog mark the transition to terrestrial habitats. There is some zonation of vegetation in the large mosaic area on Annagh East. The tops of the mounds contain species such as Creeping Bentgrass, Red Fescue and Autumn Hawkbit amongst the Sea Rush, while the lower hollows and channels contain species such as Sea Pink, Sea Plantain and Saltmarsh Rush amongst the Sea Rush.

The smaller areas of MSM generally do not contain much saltmarsh topography. There is a low saltmarsh cliff marking the boundary between the *Spartina* sward and the MSM on Annagh West. This cliff shows some signs of erosion. In other areas there are deep saltmarsh creeks where the saltmarsh has developed over peat. The largest area of MSM is located in Annagh Island East. This area is a mosaic dominated by MSM. There are patches of ASM within the mosaic area and a ring of ASM also surrounds the mosaic area on elevated ground up the banks. There are patches of exposed single and pebbles in some of the pans. These areas have developed a relatively good topography of creeks and pans and interact with the hummocks and hollow glacial topography that underlies the saltmarsh. In the mosaic area, several large creeks drain the whole area and there are several smaller channels with ASM vegetation between the MSM on the taller mounds draining into these larger creeks. Patches of MSM also line some of the small intertidal inlets and pools on the island. A 1410/1330 (ASM/MSM) mosaic is also present in the NE section. This area shows signs of erosion. This may be induced somewhat by heavy sheep grazing.

4 IMPACTS AND ACTIVITIES

There are few activities affecting this saltmarsh site, due to its relative isolation (Table 4.1). However, the main activity, sheep grazing, is having a very significant impact. The activity codes used in Table 4.1 are given in brackets in the following text. Three are several enclosures on the island but these are on the higher areas and contain dry acid grassland and improved grassland. All of the saltmarsh habitats are situated in common unfenced areas, which also contain the dry acid grassland, scrub and other terrestrial habitats. Sheep also move around the island over the intertidal flats at low tide and also visit some of the smaller islands around the Annagh Island site. There are signs of heavy grazing pressure and overgrazing all over the site with the ASM having a typical low close-cropped sward (143). The MSM areas are shielded somewhat from the most intense grazing as the rushes protect the rest of the vegetation, and some ASM species are much better developed in this habitat. However, the ASM patches within the MSM-dominated mosaics are also heavily grazing. Even the *Spartina* sward was heavily grazed with a low close-cropped sward developing. This gives an indication of the grazing pressure on the rest of the site if the sheep are grazing Common Cordgrass, which is generally unpalatable to sheep.

Common Cordgrass is present at this site. This species was planted here in the 1930s Common Cordgrass is an invasive species (954) and has formed a dense sward on mudflats in a small intertidal inlet. However, there are no signs that this species has invaded the existing saltmarsh vegetation surrounding this area. No other clumps were recorded on the saltmarsh, which would be expected (although some are present on an adjacent site at Kiladangan). There are also no signs of recent colonisation or significant spread on the mudflats. These observations indicate that the rate of spread has been quite slow in this area compared to other sites. This species is not likely to spread significantly in the near future and if it does spread it is more likely to spread on the unvegetated intertidal mud rather than on existing Annex I saltmarsh habitats. There are small areas of intertidal mud that would be suitable for Common Cordgrass all along the east side of the site (and along many of the other shorelines in Clew Bay).

There are several tracks across the site over both saltmarsh habitats (501). These tracks allow access to the various parts of the island for tractors. There are some wheel ruts in parts of the ASM but most of this habitat is unaffected.

Some of the saltmarsh shows signs of erosion, particularly in the north-east section (900). In this area there are patches of exposed peat and glacial sediments. There is probably natural erosion occurring in this area but it is likely to be exacerbated by the heavy sheep grazing, poaching and stripping of saltmarsh vegetation from the saltmarsh surface. Some of the low saltmarsh cliffs marking the seaward boundaries along the pools and some of the intertidal areas also show signs of erosion. However, an examination of the 2000 aerial photo and the 6 inch map indicates that there have been no significant losses of saltmarsh habitat due to erosion.

There are few activities immediately adjacent to Annagh Island saltmarsh habitats. Grazing affects the entire island with the terrestrial grassland also overgrazed. Some of the enclosures on the island contain improved grassland and one of these has been cut for fodder (120, 140). There is some aquaculture (oyster trestles) in the intertidal and subtidal areas to the west of Annagh Island (200).

Table 4.1. Intensity of various activities on saltmarsh habitats at Annagh Island.

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
1310	140	C	0	0.01	Inside
1330	143	A	-1	4.45	Inside
1410	140	C	0	4.46	Inside
13s	501	C	-1	< 0.1	Inside
13s	900	C	-1	1.5	Inside
13s	954	C	0	0	Inside
13s	120	C	0	8.92	outside
13s	143	C	0	8.92	outside
13s	200	C	0	8.92	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.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

Overall this site has a poor conservation status (Table 5.1). The most significant activity on this site is sheep overgrazing and the heavy grazing pressure is mainly affecting the ASM by creating a low uniform closely cropped sward, probably lowering diversity and creating patches of bare substrate cover from stripping of vegetation and poaching.

The conservation value of the site is enhanced by its relative isolation from the mainland and from disturbance. There are also interesting transitions present between the saltmarsh and the terrestrial grassland due to the complex topography overlying the glacial material and due to its complex ontological development with some areas having a peat substrate and some areas having a marine-sediment substrate.

A comparison of the 2000 aerial photo to the 1929 6 inch map indicates that this site is relatively stable and there has not been much accretion or erosion during this period. The heavy grazing pressure may be exacerbating erosion of the both the ASM and MSM, with signs of erosion present, but there are no indications that areas of saltmarsh have been lost due to erosion.

Common Cordgrass is present at this site. This is an invasive species, but it is unlikely to become extensive at this site under current conditions. If current conditions favoured the spread of Common Cordgrass it is likely to have already happened considering the time it has been present (since the 1930s). There may be some more spread of Common Cordgrass within salt pans, along creeks and bare mud at the site in the future but it is unusual for a site to have Common Cordgrass in just one location. More clumps scattered over the saltmarsh and in some of the creeks and pans are to be expected. The absence of these clumps indicates that its rate of spread is very slow and seed production is probably poor. The current management conditions and the heavy grazing pressure are likely to increase the potential for Common Cordgrass to spread but eroding the saltmarsh and creating bare areas of peat/mud that are suitable for colonisation by a pioneer species like Common Cordgrass.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are moderate-good. Annagh Island has a complex topography with a series of small hills, low mounds and gradually sloping areas containing terrestrial grassland. These areas will allow migration of saltmarsh habitats as they adjust to rises in sea level. Any geomorphological changes to the shingle/pebble/cobble barrier/bank are likely to have a significant impact on the saltmarsh.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Annagh Island.

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

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

5.2.1 Extent

Only a small area of this habitat was mapped at this site (0.1 ha). There is no information on the previous extent of this habitat in Clew Bay. There are several small unmapped patches

within some of the bare mud creeks in the MSM area. The extent is assessed as favourable maintained as there is no evidence that it was more extensive in the recent past. The intertidal area covered by Common Cordgrass is likely to have contained suitable habitat for Glasswort, but this was colonised prior to the current period of assessment.

5.2.2 Habitat structure and functions

The structure and functions of this habitat were assessed as favourable. Glasswort and Annual Sea Blite have colonised a sheltered band of stony sediment. No other saltmarsh species are present and this area is not likely to act as a pioneer zone for any saltmarsh vegetation as it is isolated from the main saltmarsh areas. There are no impacts or activities affecting this habitat. Small areas of Glasswort-dominated habitat are transient in nature and are dependant on local tidal conditions providing banks of bare accreting (or eroding) mud/sand dominated substrate. Accreted banks of sediment may change position or disappear very quickly depending on the tidal conditions.

5.2.3 Future prospects

The future prospects of this habitat are assessed as *favourable* as they are not affected by any activities. These patches of habitat are not vulnerable to spread of Common Cordgrass in the current conditions but any sea level rise could make these areas vulnerable to erosion or colonisation by Common Cordgrass.

5.3 Atlantic salt meadows (H1330)

5.3.1 Extent

Overall, the extent of this habitat is assessed as *favourable* in the absence of other information on the previous extent of this habitat. There are no indications of any loss of habitat due to erosion at this location and no indications of any loss of habitat due to other activities.

5.3.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-bad*. Five monitoring stops were carried out on this habitat and four stops failed. The failed stops did not reach targets for % bare ground and were assessed as being heavily grazed and or heavily poached. Heavy grazing pressure has created these conditions. The heavy grazing may also be affecting species diversity with several species appearing infrequently or were absent such as Sea Arrowgrass and Lax-flowered Sea Lavender (*Limonium humile*). Grazing has created miniature saltmarsh plants and the abundance of Sea Pink and Sea Plantain in the middle marsh zone is significant and probably exacerbated by the heavy grazing. Other ASM plant communities such as the upper community dominated by Saltmarsh Rush and Red Fescue and the lower community dominated by Common Saltmarsh-grass has a lower bare substrate cover but still have a very low sward height and the overall sward structure is

quite uniform (apart from the clumps of Sea Rush). There are also some sings of erosion, particularly in the mosaic area in the north-east section, which is probably being exacerbated by the heavy grazing.

Other attributes such as zonation and pan and creek structure are present and increase the habitats quality. There are frequent transitions to dry coastal grassland, sometimes in complex mosaics, which also increase the conservation value. Common Cordgrass, an invasive species and a negative indicator was recorded on the site but is not present in this habitat.

5.3.3 Future prospects

The future prospects of this habitat are assessed as *unfavourable-bad*. This assessment assumes that the current management activities and level of impacts continue in the near future. Heavy grazing pressure is having a significant impact on this site and is likely to continue in the future. There is no conservation plan available for the coastal habitats in this SAC.

5.4 Mediterranean salt meadows (H1410)

5.4.1 Extent

Overall, the extent of this habitat is assessed as *favourable* in the absence of other information on the previous extent of this habitat. There are no indications of any loss of habitat due to erosion at this location and no indications of any loss of habitat due to other activities.

5.4.2 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 all passed. Overall, the species diversity is typical for this habitat. There are several other typical indicators of good structure and function present including well-developed creeks and pans. The MSM is grazed but the intensity is low as the dense Sea Rush tends to shield the other species. The MSM-dominated mosaic area on Annagh East contains some plant zonation due to its complex topography of low mounds and hollows. The small ASM patches within the MSM tend to be targeted by the sheep and are grazed as heavily as the other ASM areas. The habitat is quite fragmented and found in several areas on the island, adding to the diversity. Common Cordgrass, an invasive species and a negative indicator was recorded on the site but is not present in this habitat.

5.4.3 Future prospects

The future prospects of this habitat are assessed as *favourable*. This assessment assumes that the current management activities and level of impacts continue in the near future. Grazing is not having as significant an impact on MSM compared to ASM.

6 MANAGEMENT RECOMMENDATIONS

Significant reduction in grazing levels is required to allow the saltmarsh habitats recover at this site.

7 REFERENCES

Nairn, R.G.W. (1986). *Spartina anglica* in Ireland and its potential impact on wildfowl and waders - a review. *Irish Birds*, 3, 215-258.

Praeger, R.L. (1932). Some noteworthy plants found in or reported from Ireland. *Proceedings of the Royal Irish Academy*, 41B, 95-124.


Annagh East
Annagh Lough
Annagh Middle
Sruffonboun Strand
Annagh West
Legend
SAC boundary
1330 Monitoring stops
1410 Monitoring stops
Habitats
1310 Salicornia flats
Spartina swards
1330 Atlantic salt meadows
1410 Mediterranean salt meadows
1330/1410 mosaic
other
Saltmarsh Monitoring Project
Annagh Island
SMP Code: SMP0011
Map produced by: SMP 2006
Map Version: 1
Clew Bay complex cSAC (001482)
0 100 200 300 Meters
Scale: 1:4481
N

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

1 SITE DETAILS

SMP site name: **Bartraw**		SMP site code: **SMP0020**
Site name (Curtis list): **Bartraw**		CMP site code: **111**
		Site No: (Curtis list): **81**
NPWS Site Name: **Clew Bay complex**		Dates of site visit: **14/07/2006**
NPWS designation	SAC: **1482**	MPSU Plan: **none for coastal areas**
	pNHA: **1482**	
County: **Mayo**		Discovery Map: **30** Grid Ref: **090490, 283220**
6 inch Map No: **Ma087**		Aerial photos (2000 series): **02138-b, 02076-d**

Annex I habitats currently designated for Clew Bay complex SAC:

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

Other SMP sites within this SAC/pNHA: **Mallaranny, Tooreen, Rosmurrevagh, Tierna, Rockfleet Castle, Roshanagh East, Caraholly South, Kiladangan, Annagh Island**

Saltmarsh type: **Sand flats** Substrate type: **Sand/glacial till**

2 SITE DESCRIPTION

Bartraw saltmarsh is located along the southern edge of Clew Bay in Co. Mayo, at Murrisk 8 km west of Westport. This site is situated at the base of the Croagh Patrick foothills. The saltmarsh is part of a larger system of coastal habitats and is associated with a long sand spit containing a sandy beach and sand dune system. Bartraw Beach is a Blue Flag Beach and is a popular site for locals and tourists. The sand dune habitats were surveyed by the Coastal Monitoring Project. The adjacent land is farmed with agricultural grassland predominant. There are also frequent dwellings in this area.

The Annex I habitat, Atlantic salt meadows (ASM), is present at this site. This habitat is listed as a qualifying interest for this SAC. Nearly all the saltmarsh habitat is situated within the Clew Bay Complex SAC. A small area of habitat is excluded outside the boundary because an old field boundary from the 6inch map was used to mark the SAC boundary, and the position of this boundary has since changed.

This site is assessed easily via the minor roads to Bartraw beach. A car park is situated at the southern end of the beach adjacent to the saltmarsh.

3 HABITATS

3.1 Atlantic salt meadows (H1330)

The saltmarsh has developed at the back of the sand spit in a small sheltered area between the sand spit and the mainland. This was one of the smallest sites visited during the survey (Table 3.1). A small patch of Atlantic salt meadow (ASM) is present where muddy sand has been allowed to deposit. A thin band of saltmarsh continues east along the Murrisk shoreline outside the surveyed area.

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

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	0.41*
	Total	**0.41**

*note that saltmarsh habitat continues outside the surveyed area.

This site was not grazed and relatively tall rank vegetation was present. Several vegetation communities have developed with zonation dependant on elevation. A lower saltmarsh community dominated by Common Saltmarsh-grass (*Puccinellia maritima*) and Glasswort (*Salicornia* sp.) is present along the seaward edge. Sea Plantain (*Plantago maritima*), Lax-flowered Sea Lavender (*Limonium humile*), and Sea Arrowgrass (*Triglochin maritimum*) become more frequent towards the upper part of this zone. Other species present include Sea Pink (*Armeria maritima*), Sea Milkwort (*Glaux maritima*), Annual Sea-Blite (*Suaeda maritima*) and Lesser Sea-spurrey (*Spergularia media*). There are small patches with a typical mid-marsh community dominated by Sea Pink and Sea Plantain. The south-east section contains a patch of mid-upper saltmarsh dominated by Red Fescue (*Festuca rubra*) and Saltmarsh Rush (*Juncus gerardii*) and containing many of the other species listed above.

The small area of saltmarsh means that the topography is generally poorly developed. Only several small salt pans are present. Small creeks drain the central section. There are several small mounds towards the southern side of the site that may have been artificially created.

The saltmarsh transitions to semi-fixed dune grassland along the northern side at the back of the sand spit. The southern boundary is marked by a stone wall and fence-line enclosing improved grassland. The transition to grassland is marked by a band of vegetation on the strandline dominated by Creeping Bentgrass (*Agrostis stolonifera*) and containing frequent Frosted Orache (*Atriplex laciniata*) and Common Scurvygrass (*Cochlearia officinalis*). These upper saltmarsh communities also develop on some mounds along the landward boundary.

4 IMPACTS AND ACTIVITIES

There are few activities on the saltmarsh at this site (Table 4.1). The activity codes used in Table 4.1 are given in brackets in the following text. The site is not grazed as the sand dune

system and sandy beach is an important amenity. One notable feature of this site is the luxuriant development of Lax-flowered Sea Lavender, probably due to the lack of grazing. There are several tracks (501) along the front and at the sides of the saltmarsh. These allow vehicles to access the Murrisk shoreline from the Bartraw car park, but are probably only used for boating/fishing/agricultural activities and not for amenity access. There is a small vegetated mound at the inner part of the saltmarsh adjacent to the public toilets that are likely to be soil/spoil deposited after construction but it is not known how long it has been there.

A comparison of the 2000 aerial photo to the 1929 6 inch map indicates that some accretion has taken place during this period and the saltmarsh has got larger as a result.

Activities adjacent to the saltmarsh habitats include farming (120, 140), dwellings (403), roads (502) and leisure activities associated with the beach (609).

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

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
1330	501	C	-1	< 0.1	Inside
1330	120	C	0	0.41	Outside
1330	140	C	0	0.41	Outside
1330	403	C	0	0.41	Outside
1330	502	C	0	0.41	Outside
1330	609	C	0	0.41	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.

5 CONSERVATION STATUS

5.1 Atlantic salt meadows (H1330)

5.1.1 Extent

Overall, the extent of this habitat is assessed as *favourable* (Table 5.1). There is no previous information on the extent of saltmarsh at this location. A comparison of the 1930 6 inch map to the 2000 aerial photo indicates that there has been accretion and growth of saltmarsh in this period.

5.1.2 Habitat structure and functions

Overall, the structure and functions of this habitat are assessed as *favourable*. Two monitoring stops were carried out at this site and both passed. It was decided that two stops represented the site adequately as it was so small. The species diversity at this site was typical of this habitat and several different saltmarsh plant communities were present, with zonation dependant on elevation. The vegetation was in good condition as there was no

grazing. No grazing has allowed the vegetation to become rank in places but due to zonation there is a variety of sward heights from 3-20 cm. All the other targets were reached including plant ground cover and no poaching. The creek and pan topography are poorly developed but this is typical of a small site. This is one of the few ungrazed saltmarshes in Clew Bay and is therefore locally distinctive.

No Cordgrass (*Spartina anglica*) was recorded at this site. However, this site is close to Annagh Island and Kildanagan, where this species is present. Bartraw is therefore vulnerable to the spread of Cordgrass in the future.

5.1.3 Future prospects

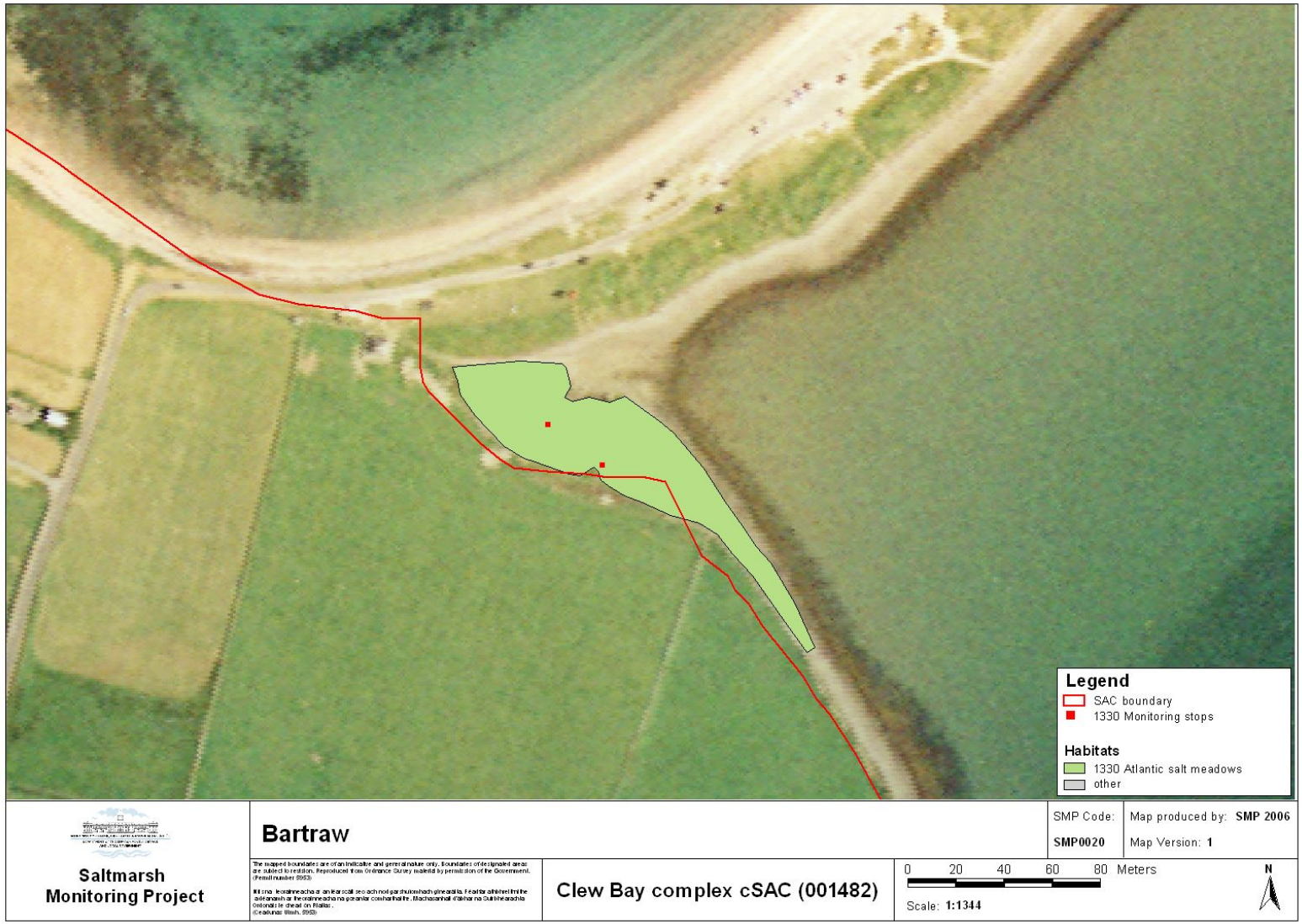
The future prospects of this habitat are assessed as *favourable*. This assessment assumes that the current management activities and level of impacts continue in the near future.

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

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

6 MANAGEMENT RECOMMENDATIONS

None


Legend
SAC boundary
1330 Monitoring stops
Habitats
1330 Atlantic salt meadows
other
Saltmarsh
Monitoring Project
Bartraw
SMP Code:
SMP0020
Map produced by: SMP 2006
Map Version: 1
Clew Bay complex cSAC (001482)
0 20 40 60 80 Meters
Scale: 1:1344
N

Appendix XI – Bartraw site report and habitat map from the Coastal Monitoring Project (Ryle *et al*., 2009)

SITE DETAILS

CMP06 site name: **Bartraw** CMP06 site code: **111** CMP Map No.: **109**

County: **Mayo** Discovery map: **30** Grid Reference: **L 900 833**

6 inch Map No.: **Ma 087**

Aerial photographs (2000 series): **O 2076-B, D; O 2138-B**

NPWS Site Name: **Clew Bay Complex**

NPWS designation: pNHA: **1482** SAC: **1482**

Other Designation: **Blue Flag Beach**

Ranger Area: **Mayo**

MPSU Plan: **Not Available**

Report Author: **Tim Ryle**

SITE DESCRIPTION

Bartraw is located in Clew Bay. It is situated at the foot of Croagh Patrick, approximately 10 kilometres to the west of Westport. Clew Bay is a west-facing bay, open to the Atlantic. It is a drowned drumlin bay, with a great many small islands (anecdotally reputed to be 365). Its long shoreline and many drumlin islands are protected somewhat from the Atlantic swells by the presence of Clare Island, which sits at the mouth of the Bay.

NPWS information suggests that Clew Bay has the most significant shingle reserves and the only example of incipient gravel barriers in the country. Owing to its geomorphological interest, it supports a great diversity of marine and terrestrial habitats and has been proposed as a candidate Special Area of Conservation (SAC 1482). These habitats (and the approximate cover as listed in the NATURA 2000 dataform) include Large shallow inlet and bays (79%), Coastal lagoons (1%), Atlantic Salt meadows (1%), Annual strandline and perennial vegetation of stony banks (both 1%), as well as Embryonic and Shifting dunes along the shoreline with *Ammophila arenaria* (both 1%). The only notable plant species that the site is listed for is *Hammarbya paludosa* (Bog orchid).

Despite the relative size and length of the shoreline, Bartraw is one of only two sand-dune sites listed within the SAC. It is a tombolo, or a long narrow shingle ridge connected to a small island, which extends northwards into the Bay. This blue flag beach is popular with many recreational users, mostly for swimming and walking. The southern end of the site is managed for amenity use, with toilets, notice boards and a car park in place. Bartraw continues to bear the brunt of Atlantic swells and as a result Mayo County Council have installed a number of protection measures – namely extensive bands of large boulders, rock gabions and wooden palisade fencing to encourage sediment trapping.

The areas for the sand dune habitats recorded from Bartraw are given in Table 111A. Other habitats, and their approximate areas in brackets, include an area of amenity grassland managed by Mayo County Council (0.138ha) and other undefined vegetation types that are not part of the sand dune system (0.229ha). An area of Atlantic saltmarsh (0.422ha) is recorded from a sheltered cove near the car park. A full description of this habitat has been produced by the Saltmarsh Monitoring Project (McCorry, 2007).

Table 111A **Areas of EU Annex I habitats mapped at Bartraw**

EU Code	***EU Habitat***	Area (ha)
H1210	Annual vegetation of drift lines	0.038
H1220	Perennial vegetation of stony banks	0.480
H2110	Embryonic shifting dunes	0.023
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	0.184
H2130	Fixed coastal dunes with herbaceous vegetation	12.261
	Total Sand dune	**12.986**

Fixed Dunes (H2130)

Fixed Dunes account for the greater portion of the sand dune habitat at Bartraw (12.261ha). Notwithstanding this fact, much of it is species-poor, or altered to some degree through management or recreational uses. The vegetation was generally characterised by the presence of *Ammophila arenaria* (Marram), which ranged in cover from 10% to 70%. However, the other principal grass, *Festuca rubra* (Red fescue) rarely accounted for less than 40% of ground cover.

Other than the above two grasses, fixed dune species present included *Galium verum* (Lady's bedstraw), *Plantago lanceolata* (Ribwort plantain), *Lotus corniculatus* (Common bird's-foot-trefoil), *Luzula campestris* (Field woodrush), *Trifolium repens* (White clover), *Achillea millefolium* (Yarrow) and *Bellis perennis* (Daisy).

Botanically the most diverse area of fixed dunes occurs on the island at the northern end of the site on Bartraw proper. Tall, marram-dominated ridges surround a large hollow that is characterised by low grassland sward with an extensive bryophyte layer. There is a greater proportion of fine grained sand here than observed on the narrow shingle bar. The nature of the sand coupled with the relative shelter of this area apparently influences the species richness. Species recorded here included *Viola tricolour* (Wild pansy), *Gentianella campestris* (Field gentian), *Thymus polytrichus* (Wild thyme) and *Prunella vulgaris* (Selfheal), a species often associated with dune slacks.

Negative indicator species were not common. However, *Cirsium arvense* (Creeping thistle) and *Senecio jacobaea* (Common ragwort) were sometimes recorded throughout the habitat, along with *Cynosurus cristatus* (Crested dog's tail), particularly in areas subject to pedestrian

traffic. Mosses included *Rhytidiadelphus squarrosus*, *Eurhyncium* spp. and small amounts of *Tortula ruraliformis*.

Some of the fixed dune vegetation surrounding the car park is managed by the County Council for amenity purposes. The condition and conservation value of the fixed dune in this section of the site is deteriorating and grasses such as *Lolium perenne* (Perennial ryegrass), *Holcus lanatus* (Yorkshire fog) and *Poa annua* (Annual poa grass) are becoming more abundant.

Mobile Dunes (H2120)

Mobile dunes have previously been recorded from Bartraw. Owing to the pressures of the erosion, however, they are not well represented at Bartraw and occupy an area of 0.184ha (Table 111A). Their distribution is patchy, most of it associated with recently installed sand trap fences. Characterised by *Ammophila arenaria* (Marram), other species recorded from the single monitoring stop were *Daucus carota* (Wild carrot) and *Tripleurospermum maritimum* (Sea mayweed). Other species that were occasionally noted from the mobile dunes include *Leymus arenaria* (Lyme grass), *Taraxacum officinale* agg. (Dandelion) and *Tussilago farfara* (Colts-foot). The negative indicator species *Senecio jacobaea* (Common ragwort) was occasionally recorded, but was rarely a major component of the vegetation.

Embryonic Dunes (H1220)

Embryonic dunes are not extensive (0.023ha) and their distribution is described as patchy. They occur as a narrow band in a few small sheltered or protected areas to the seaward side of the bar. Where the habitat was recorded, it was generally fronted by shingle strandline vegetation. As is typical for most embryonic dunes, it is characterised by few species, namely *Elytrigia juncea* (Sand couch) with some *Leymus arenaria* (Lyme grass).

Shingle Vegetation (H1220)

The term shingle ridge is somewhat misleading, as there is a great variety in the size/range of the substrate that was observed along the exposed, western side of Bartraw. The substrate ranged from fine sand to coarse grit and on upwards through a variety of pebbles and cobbles. Perennial strandline vegetation was recorded on all of these substrates, except at the foot of the steeply graded Rock Armour, which was installed almost on the low water mark. This vegetation type occurred as discrete but relatively wide patches to the seaward side of the shingle bar and as a thin, near-continuous strip on the opposite side of the shingle bar (inner bay). In total, the vegetated shingle covered an area approaching 0.5ha (Table 111C).

This habitat is characterised by *Tripleurospermum maritimum* (Sea mayweed) and *Rumex crispus* (Curled dock) with small amounts of *Silene uniflora* ssp. *maritima* (Sea campion).

Other species present include *Honckenya peploides* (Sea sandwort), along with the annuals *Atriplex laciniata* (Frosted orache) and *Galium aparine* (Cleavers).

Annual Strandline (H1210)

Whilst the majority of the strandline is characterised by perennial vegetation of stony banks, vegetation of annual strandlines was recorded at only two adjacent locations on the seaward side of the shingle bar. Here, pockets of fine-grained sand occurred, which may have been influenced by the coastal protection works fronting the car park.

IMPACTS

Probably the most significant impact at Bartraw is natural erosion (code 900), owing to its exposed position. The narrow spit is constantly under threat from the tides and storm surges. It is not possible to quantify its extent, other than to say that its influence is rated as high and all habitats are subject to it. Erosion is probably most noticeable at the northern end of the site along the steep face of the fixed dunes.

The County Council has recently undertaken a programme of coastal defence works (code 871) which include the emplacement of boulder armour alongside the car park, coupled with a large boulder/gabion sea wall towards the northern end of the shingle bar. In general, the installation of the coastal protection works is considered as a negative activity as it often retards the dynamics of the shingle/pebble habitat.

Table 111B Intensity and impact of various activities on sand dune habitats at Bartraw

EU Habitat Code[1]	**Activity Code**[2]	**Intensity**[3]	**Impact**[4]	***Area affected/ha***	**Location of Activity**[5]
H2130	490	A	-2	0.108	Inside
H2130	501	B	-1	0.25	Inside
H2130	608	C	0	<0.01	Inside
H2130	622	B	-1	0.25	Inside
H2130	790	C	-1	Unknown	Inside
H2130	871	A	2	Unknown	Inside
H2120	871	A	2	Unknown	Inside
H1220	871	A	0	Unknown	Inside
H2130	900	B	-1	Unknown	Inside
H2120	900	A	-1	Unknown	Inside
H2110	900	A	0	Unknown	Inside
H1220	900	A	0	Unknown	Inside
H1210	900	A	0	Unknown	Inside

[1] EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.

[2] Description of activity codes are found in Appendix 3

[3] Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.

[4] Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence

[5] Location of activity: Inside = activities recorded within and directly impacting the sand dune habitat. Outside = activities recorded outside but adjacent to sand dune habitat that are impacting the sand dune habitat

Recreational pressure is another important impact of the site, as it is a highly popular recreational beach, as evidenced by its Blue Flag Status. Mayo County Council manages the site in such a way that vehicles cannot proceed beyond the car park (code 490). Pedestrian traffic (code 622), however, is having a moderate impact on the site, along most parts of the site. However, the popularity and ease of access has in places undermined the integrity of the fixed dune vegetation. Small blowouts and bare patches occur alongside unvegetated trails (code 501), particularly along the narrow band of fixed dunes on the spit. The County Council have put a dune restoration programme in place with notices indicating their intention and chestnut paling fences to trap sand and re-route pedestrian around fragile areas. Littering (code 790) is a minor problem, although litter was found buried in at least two locations where foot traffic had loosened the sand. Another negligible impact is that of camping (code 608). Although prohibited at the site, there are signs that the site is occasionally used for camping.

CONSERVATION STATUS

The conservation assessments listed in Table 111C are based on a review of appropriate information from the site coupled with survey work where monitoring stops were carried out to rate the condition of the habitat. Previous information includes ASI reports and NPWS documents including NHA and NATURA 2000 information. There is currently no management plan for Clew Bay SAC.

TABLE 111C CONSERVATION STATUS OF ANNEX I SAND DUNE HABITATS AT BARTRAW

HABITAT[1]	**EU Conservation Status Assessment**			**Overall EU conservation status assessment**	**Proposed Irish conservation status system**[2]
	FAVOURABLE	**Unfavourable – Inadequate**	**Unfavourable - Bad**		
FIXED DUNES (H2130)	Extent / Structure & Functions / Future Prospects			**Favourable**	**Favourable - Maintained**
MOBILE DUNES (H2120)	Structure & Functions	Future Prospects	Extent	**Unfavourable - Bad**	**Destroyed - Partially Destroyed**
PERENNIAL SHINGLE (H1220)	Extent / Structure & Functions / Future Prospects			**Favourable**	**Favourable - Maintained**

[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)

Fixed Dunes (H2130)

Although occurring on a large shingle bar, considerable volumes of sand have accumulated over time enabling the establishment of fixed dune vegetation. As they occupy the greatest area of the site, they are rated as *favourable* for extent (Table 111C).

While much of the vegetation is rank in nature, the diversity, health and condition of the habitat is *favourable*, as reflected in all four monitoring stops, which satisfied the structure and functions criteria (Table 111D).

In light of the dune protection works undertaken by Mayo County Council to prevent habitat loss to erosion and recreational pressures, the future prospects for the habitat are *favourable* (Table 111C).

In light of this, the overall EU conservation assessment for the fixed dunes habitat is *favourable*, whilst the Irish conservation assessment is *favourable-maintained* (Table 111C).

TABLE 111D PASS/FAIL RESULTS OF MONITORING STOPS FOR ANNEX I SAND DUNE HABITATS AT BARTRAW

	Monitoring stops		
HABITAT	**Pass**	**Fail**	**Conservation status**
FIXED DUNES (H2130)	4	0	**Favourable**
MOBILE DUNES (H2120)	1	0	**Favourable**
PERENNIAL SHINGLE (H1220)	4	0	**Favourable**

Mobile Dunes (H2120)

Owing to the erosive nature of the Atlantic swells and winds that Bartraw is subject to, mobile dunes are not extensive. They were mostly associated with the palisade fencing that was installed as sand-trapping and dune defence works. Thus the extent is rated as *unfavourable-bad* (Table 111C).

Although only a single monitoring stop was carried out in the habitat owing to its limited extent (Table 111D), the structure and functions are considered *favourable*.

The future prospects are unclear, however and despite the installation of sand-trapping fences, the short-term resilience of the habitat in light of ongoing erosion is rated as *unfavourable-inadequate* (Table 111C).

In light of this, the overall conservation rating for the habitat is *unfavourable-bad*. The Irish conservation assessment is *destroyed-partially destroyed*.

Embryonic Dunes (H2110)

Owing to its exposed nature in Clew Bay, the embryonic dunes at Bartraw are extremely small in extent. For this reason no conservation assessment is given for the habitat.

Perennial Shingle (H1220)

One of the significant features of Clew Bay is the abundance of shingle and stony substrate, and perennial vegetation of rocky banks has been commonly noted around its entire length. Indeed the NATURA 2000 dataform gives the habitat a *favourable* conservation rating. Although the area of vegetated perennial vegetation of stony banks is not extensive at Bartraw, its extent is rated as *favourable* (Table 111C) as it is found around much of its length.

In addition, all four monitoring stops were *favourable* on the Structure and functions (Table 111D).

The future prospects are rated as *favourable* (Table 111C) as there is a readily available supply of sediment from the underlying shingle bar and the vegetation of stony banks would appear to be expanding amongst the recently installed rock armour.

As all three parameters of conservation status are favourable, the overall EU assessment for perennial vegetation of rocky banks at Bartraw is rated as *favourable* (Table 111C). The equivalent Irish conservation assessment is *favourable-maintained*.

Annual Strandline (H1210)

No conservation assessment is made for annual strandline vegetation at Bartraw owing to its limited extent. The NATURA 2000 dataform, however, notes that its conservation status for the entire Bay is *favourable*.


SAC 1482
Habitats
Strandline
Strandline - shingle
Embryonic Dune
Mobile Dune
Fixed Dune
Saltmarsh
Amenity grassland
Other (Undefined)
Coastal Monitoring Project 2004-2006
National Parks and Wildlife Service
Bartraw
Clew Bay Complex (SAC 1482)
CMP code: 111
This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated areas are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 5953)
0 100 200 300 400 500 Meters
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:15147
N

Appendix XII – Rosmurrevagh site report and habitat map from the Coastal Monitoring Project (Ryle *et al.*, 2009)

SITE DETAILS

CMP06 site name: **Rosmurrevagh** CMP06 site code: **112** CMP Map No.: **110**

County: **Mayo** Discovery map: **30** Grid Reference: **L 826 956**

6 inch Map No.: **Ma 066**

Aerial photographs (2000 series): **O 1837-B, D; O 1838-A, C; O 1898-A**

NPWS Site Name: **Clew Bay Complex**

NPWS designation: pNHA: **1482** SAC: **1482**

Other Designation: **Blue Flag Beach (Mullranny)**

Ranger Area: **Mayo**

MPSU Plan: **Not Available**

Report Author: **Tim Ryle**

SITE DESCRIPTION

Rosmurrevagh is situated on the northern shore of Clew Bay below the village of Mullranny. It is a large site, approximately 4 kilometres in length. This relatively large machair system occurs in close proximity to an extensive saltmarsh and a golf course. The area around Mullranny is popular with many recreational users, mostly swimmers and walkers. Much of the recreational value of the site is found at its western side where the blue flag beach is located, in front of the extensive saltmarsh that is protected by a large engineered cobble bank (2-3.5 metres tall). There is also a walkway across the saltmarsh that leads onto the beach. This walkway was constructed as part of the Victorian hotel's (Recently redeveloped and renamed Park Inn Hotel) attractions for its guests.

The relatively extensive machair to the east of the golf course is not well known, or indeed excessively used and was considered by Bassett (1983) to be of some conservation value owing to the presence of an infilling lake at the back of the golf course.

Rosmurrevagh is one of only two sand-dune sites (Bartraw, CMP site 111) listed within Clew Bay candidate Special Area of Conservation (SAC 1482). The site is of conservation interest owing to the range of marine and terrestrial habitats, including Large shallow inlet and bays (79%), Coastal lagoons (1%), Atlantic Salt meadows (1%), Annual strandline and perennial vegetation of stony banks (both 1%) and Embryonic and Shifting dunes along the shoreline with *Ammophila arenaria* (both 1%). The bay is of geomorphological interest for the drumlin topography with its many islands and the reserves of shingle that are found.

The sand dune habitats that were recorded from Rosmurrevagh are given in Table 112A. Other habitats which are found in close association with the machair system include a large

area of both Atlantic and Mediterranean salt meadow, at both the eastern and western end of the site (McCorry, 2007). Scrub occurs in a number of areas, much of it characterised by *Ulex europaeus* (Gorse). However, the scrub grades into woodland at the north-western corner. Much of this mature woodland was likely planted in conjunction with the construction of the original hotel. Other habitats include small areas of agricultural land, which are located to the north-eastern end of the site where the topography starts to rise uphill. Mullranny golf course occupies an area that is estimated to cover 27.910ha.

Table 112A Areas of EU Annex I habitats mapped at Rosmurrevagh

EU Code	***EU Habitat***	Area (ha)
H1210	Annual vegetation of drift lines	0.079
H1220	Perennial vegetation of stony banks	0.010
H2110	Embryonic shifting dunes	1.380
H2120	Shifting dunes along the shoreline with *Ammophila arenaria*	0.365
H21A0	Machair	33.660
	Total Sand dune	**35.494**
	Golf course (on sandy substrate)	**27.910**
	Potential Sand dune Habitat	**63.404**

Machair (H21A0)

The machair plain at Rosmurrevagh is estimated to occupy a relatively large area, which is estimated to occupy 33.660ha (Table 112A). A large portion of the machair system was modified in 1896 with the construction of a 9-hole golf course and more recently with its expansion (27.910ha), so that the majority of the intact machair grassland occurs towards the eastern end of the site. Remnant patches or discrete sections of machair vegetation are recorded at the western boundary of the golf course and indeed as a small raised area at Mullranny that is largely surrounded by saltmarsh.

The majority of the machair grassland is relatively level and occurs on a fine sand substrate that is free draining. Small patches of damp machair are often found in conjunction with the saltmarsh or low-lying depressions where water from incoming high tides occasionally reaches.

Many typical grassland species such as *Festuca rubra* (Red fescue), *Bellis perennis* (Daisy), and *Plantago lanceolata* (Ribwort plantain) were recorded from the machair. No threatened species were recorded, though *Spiranthes spiralis* (Autumn lady's-tress) and *Gentianella campestris* (Field gentian) were occasionally noted in the sward. The low, even sward is maintained by relatively large numbers of sheep, cattle and a few horses who freely graze the machair.

Negative indicator species are not abundant and only 1 of the 4 monitoring stops failed because of their presence. Although locally abundant, *Senecio jacobaea* (Common ragwort), and *Cirsium arvense* (Creeping thistle) do not contribute greatly to ground cover in the overall

habitat. The most obvious impact owing to the grazing was bare or poached areas at the seaward side of the machair, which have been fenced off to prevent further erosion.

Although its back boundaries were not fully surveyed, it is estimated that Mullranny golf course occupies an area approximately 27.910ha. The golf course comprises a considerable area of what would have been classed as machair grassland, although a small part of this may have been saltmarsh. The course is not intensively managed in that cattle and sheep were observed roaming on the golf course. Small fences have been erected around the greens to keep the grazing animals out.

In the south-western corner of the golf course, directly behind the mobile dunes, is an area that has been fenced off (presumably by the owners of the golf course) from grazing animals (0.400ha). The area is dominated by *Ammophila arenaria* (Marram) and whilst appearing similar to the mobile dunes at its seaward side, is more species rich and is classified as ungrazed machair.

Mobile Dunes (H2120)

Mobile vegetation is not a major component at Rosmurrevagh, occupying an area of 0.365ha (Table 112A). It is located along the south-western edge of the golf course, where shifting sand is dominated by *Ammophila arenaria* (Marram). Other species amongst the relatively healthy vegetation included *Elytrigia juncea* (Sand couch) along with minor contributions of *Tussilago farfara* (Colts-foot), *Lotus corniculatus* (Common bird's-foot-trefoil) and the negative indicator species, *Cirsium arvense* (Creeping thistle).

Embryonic Dunes (H1220)

Several discrete areas of embryonic vegetation are recorded from Rosmurrevagh. Together they occupied 1.380ha (Table 112A), with the greatest area located at the south-western corner of the golf course. In places it reaches 45 metres in width, though it is generally is much narrower. The vegetation, which typically has between 40% and 55% bare ground, is characterised by *Elytrigia juncea* (Sand couch), with some *Carex arenaria* (Sand sedge), *Ammophila arenaria* (Marram) and *Honckenya peploides* (Sea sandwort).

Shingle Vegetation (H1220)

Unlike Bartraw, on the opposite side of Clew Bay (CMP site 111), perennial vegetation of stony banks is not a major component of the Rosmurrevagh site, although Bassett (1983) noted that the front of the machair system was characterised by a shingle beach. In general the strand was mainly sandy, with perennial vegetation of stony banks occurring on an area of gritty sediment occupying a mere 0.010ha. (Table 112A). The species recorded include *Atriplex prostrata* (Frosted orache), *Rumex crispus* (Curled dock), *Glaux maritima* (Sea milkwort) and *Honckenya peploides* (Sea sandwort).

Annual Strandline (H1210)

Strandline vegetation at Rosmurrevagh, although not abundant, is largely characterised by annual species. Its distribution is patchy, and combined is estimated to occupy an area of 0.79ha (Table 112A). The species typically found include *Cakile maritima* (Sea rocket) and *Honckenya peploides* (Sea sandwort).

IMPACTS

As an easily accessible beach, Mullranny is very popular with holidaymakers and beach users. The main threats are associated with intensive recreational and management of the site coupled with the effects of considerable numbers of freely roaming sheep. A full list of the activities and their impacts is presented in Table 112B.

Recreational impacts are largely confined to the western end of the site. At peak times the dedicated car park overflows onto the saltmarsh, but does not seem to have serious impacts. Littering (code 790) and other impacts associated with beach users such as tracks (code 501) etc. are not serious, as most people rarely venture from the Victorian causeway or the access road to the car park.

Table 112B Intensity and impact of various activities on sand dune habitats at Rosmurrevagh

EU Habitat Code[1]	**Activity Code**[2]	**Intensity**[3]	**Impact**[4]	***Area affected/ha***	**Location of Activity**[5]
H21A0	142	A	-1	22.2	Inside
H21A0	143	A	-1	22.2	Inside
H21AO	501	B	0	1	Inside
H21A0	601	A	0	29.8	Inside
21BB	608	C	0	Unknown	Inside
21BB	790	C	0	Unknown	Inside
21BB	871	B	-1	Unknown	Inside
21BB	900	B	0	Unknown	Inside

[1] EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.

[2] Description of activity codes are found in Appendix 3

[3] Intensity of the influence of an activity is rated as: A= high, B = medium, C = low influence and D = unknown.

[4] Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence

[5] Location of activity: Inside = activities recorded within and directly impacting the sand dune habitat. Outside = activities recorded outside but adjacent to sand dune habitat that are impacting the sand dune habitat

The majority of the machair is not generally accessed by beach users, as it is largely cut-off (although there is a public right of way through the golf course). The 9-hole golf course at Mullranny was estimated to occupy 31.9ha, 40% of which is in play (Gaynor & Browne, 1999). The golf course has been further developed since 1999 to double the number of holes although it appears to retain much of the character and management practices that were described in the earlier report on the status of golf courses in Ireland (Gaynor & Browne, 1999).

In her report on Irish coastal sites, Bassett (1983) noted that the area was largely unfenced and grazing of the machair is common. Today, large numbers of cattle (code 143), sheep and horses roam freely on the machair at the eastern end of the site, while sheep (code 142) are the principal grazing animals that are found to the west of the golf course. Indeed large numbers freely graze the saltmarsh and remnant patches of machair grassland around Mullranny Bay. So great is the impact, that natural erosion is compounded by the intensity of the grazing particularly at the front of the machair system. A number of bare areas have been fenced off in an attempt to further prevent undermining the integrity of the vegetation. While the fencing has been successful in places, particularly the south-eastern corner of the site, elsewhere it has been breached and erosion is exacerbated by poaching and grazing.

Natural erosion (code 900) is a natural feature of coastal systems and is noticeable along parts of the site. Attempts at controlling the erosion have been made in a number of areas of the site. The installation of coastal protection works (code 871) in the form of massive heaped boulder ridge was undertaken by Mayo County Council at the front of the car park at Mullranny beach. The owners of the golf course have also made attempts at curtailing loss of their amenity through the installation of gabions and rock armour along much of its seaward boundary. Some of this coastal protection has been further extended eastwards along sections of the commonage. The intensity is rated as medium and though it is not known how extensively the potentially damaging activities are, they are considered to negatively impact on the vulnerable strandline habitats.

CONSERVATION STATUS

The conservation status assessments for sand dune habitats at Rosmurrevagh are presented in Table 112C. The assessment is based on the condition of the habitat at the time of survey e.g. its extent, structure and function and its future prospects. The broader findings of the earlier surveys are interpreted in light of the findings of the current survey. Baseline information consisted of the NATURA 2000 survey, although other sources of information such as Report on the conservation of Irish Coastal Sites (Bassett, 1983) and the Survey of Irish Links Golf Courses (Gaynor and Browne, 1999) were consulted for this site. Surprisingly, the Biomar Survey of Irish machair Sites (Crawford *et al*,. 1996) did not survey this site. However, the data is rarely directly applicable in determining the conservation status assessment of the sand dune habitats presented in this report. There is currently no management plan for the site.

In addition, owing to the relative paucity of certain habitats, the number of monitoring stops taken to determine the Structure and Functions of a particular habitat did not always equal 4 or more. Table 112D illustrates the number and outcome of the monitoring stops. Monitoring

stops were not carried out in the strandline habitat owing to their relative paucity and homogeneity of the habitat.

TABLE 112C CONSERVATION STATUS OF ANNEX I SAND DUNE HABITATS AT ROSMURREVAGH

HABITAT[1]	EU Conservation Status Assessment				
	FAVOURABLE	Unfavourable - Inadequate	Unfavourable - Bad	Overall EU conservation status assessment	Proposed Irish conservation status system[2]
MACHAIR (H21AO)	Extent / Future Prospects	Structure & Functions		**Unfavourable-Inadequate**	**Unfavourable -Unchanged**
MOBILE DUNES (H2120)	Structure & Functions / Future Prospects	Extent /		**Unfavourable-Inadequate**	**Unfavourable -Unchanged**
EMBRYONIC DUNES (H2110)	Extent / Structure & Functions / Future Prospects			**Favourable**	**Favourable - Maintained**
PERENNIAL SHINGLE (H1220)	Structure & Functions*	Extent / Future Prospects		**Unfavourable-Inadequate**	**Unfavourable -Unchanged**
ANNUAL STRANDLINE (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)
* The structure and functions parameter is based on a visual assessment as monitoring stops were not carried out

Machair (H21A0)

There is an ongoing difficulty in assessing the machair, as a large part of the golf course would be considered as machair grassland. The golf course has been in existence for over a century and does not represent a loss of in extent of the habitat. For this reason, the extent of the machair is rated as *favourable* (Table 112C).

Despite the intensity of grazing that is allowed on the commonage, the machair sward remains relatively intact. The conservation assessment for structure and functions is rated as un*favourable-inadequate* (Table 112C). Three of four monitoring stops that were carried out in the machair habitat passed (Table 112D). One stop failed on the occurrence of negative indicators and height of the sward due to overgrazing.

The future prospects of this habitat are considered *favourable* (Table 112C). Some erosion has occurred to the seaward side of the machair system, which was compounded through the effects of large numbers of livestock. Recent attempts at curtailing the effects of erosion and the impacts related to the stocking-density have included the installation of exclusion fences

in places. This has resulted in a gradual revegetation of some parts of the denuded machair system.

Therefore the conservation assessment for this habitat is considered *unfavourable-inadequate* which is equivalent to the proposed Irish rating of *unfavourable-unchanged* (Table 112C).

TABLE 112D PASS/FAIL RESULTS OF MONITORING STOPS FOR ANNEX I SAND DUNE HABITATS AT ROSMURREVAGH

	Monitoring stops		
HABITAT	**Pass**	**Fail**	**Conservation status**
MACHAIR (H21A0)	3	1	Unfavourable - Inadequate
MOBILE DUNES (H2120)	1	0	Favourable
EMBRYONIC DUNES (H2110)	3	0	Favourable

Mobile Dunes (H2120)

Mobile dunes are not widespread at Rosmurrevagh, occurring only at the south-western corner of the golf course. There is little previous information as to their occurrence, hence the extent is rated as *unfavourable-inadequate* (Table 112C).

A single monitoring stop was made in the mobile dunes and the structure and functions was *favourable*, as all criteria were satisfied (Table 112D).

It is difficult to predict the future prospects of the habitat, given the relative paucity of the habitat and the presence of coastal protection works, which can limit the movement of sediment. However, as the mobile vegetation that was recorded at the site (south-western corner of the golf course) appeared to be actively expanding at the time of survey, it is rated as *favourable* (Table 112C).

Therefore the conservation assessment for the mobile dunes at Rosmurrevagh is rated as *unfavourable-inadequate* which is attributable to the relative lack of habitat. The Irish conservation assessment is rated as *unfavourable-unchanged* (Table 112C).

Embryonic Dunes (H2110)

More widespread than the mobile dunes, embryonic dunes were noted in a number of discrete patches throughout the site. The extent is rated as *favourable* (Table 112C), particularly as the system was accreting at the south-western corner of the golf course.

The structure and functions are rated as *favourable* (Table 112C). A total of four monitoring stops were placed in the embryonic dunes at Rosmurrevagh and all four passed (Table 112D).

Given the amount of coastal protection works that have been installed along the coastline around Mullranny, it is encouraging that the foredunes were accreting. In light of this fact, the future prospects are considered *favourable* (Table 112C).

There is little previous information as to the occurrence of foredunes at Rosmurrevagh. Currently, the overall conservation assessment for the embryonic dunes is *favourable* while the analogous Irish assessment is *favourable-maintained* (Table 112C).

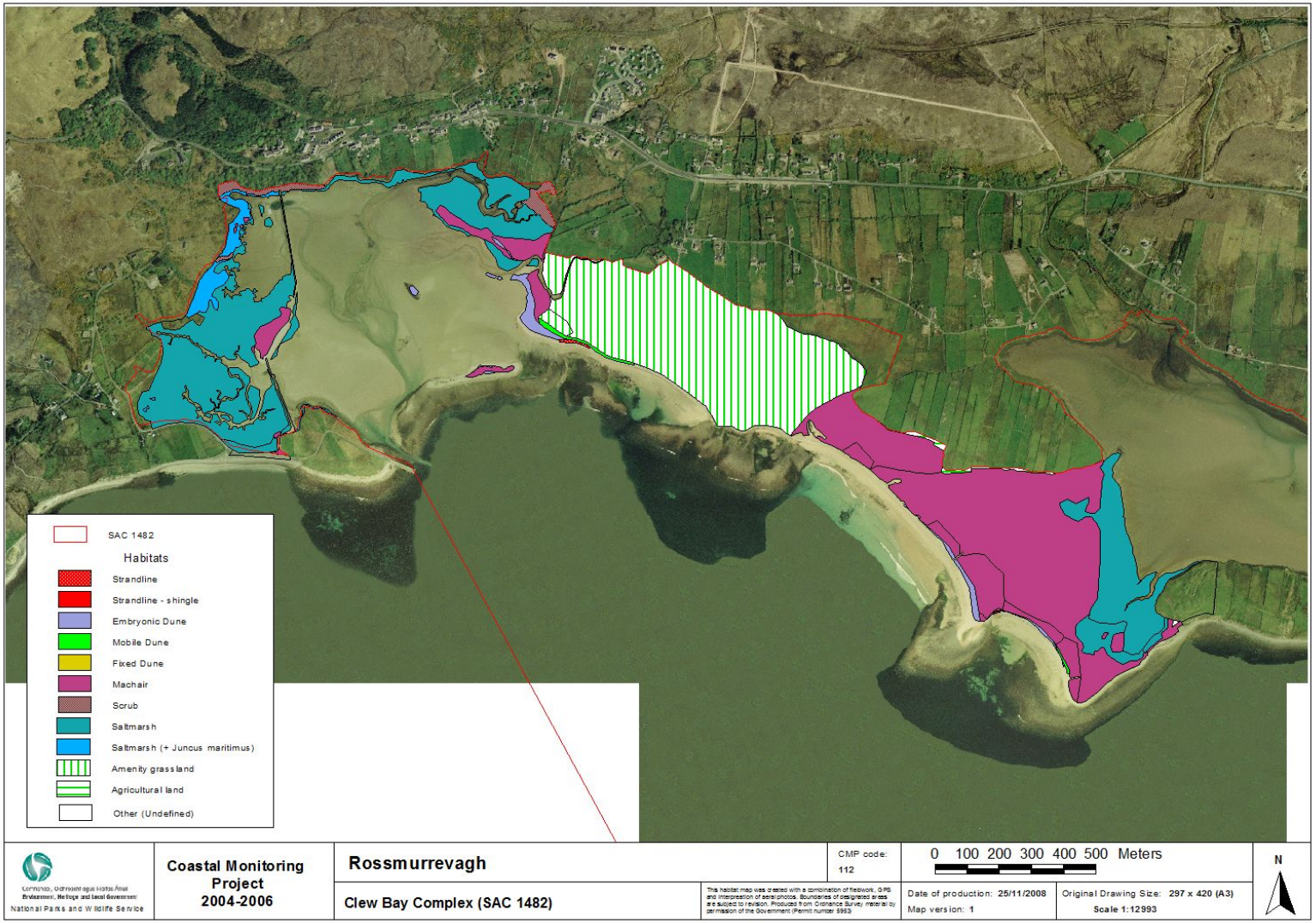
Annual Strandline (H1210) and Perennial Shingle (H1220)

Both of these habitats are assessed together, based on best scientific judgement, as they occur in close association. Neither strandline community is extensive owing to the exposed nature situation of the site and the nature of the tides within Clew Bay. Therefore the extent for both strandline communities is rated as *unfavourable-inadequate* (Table 112C).

Based on a visual assessment of the strandline communities, the species assemblages coupled with the relative vigour indicate that the structure and functions warrants a *favourable* rating (Table 112C).

The presence of both strandline communities is positive along such an exposed coastline. However, as there is little previous information about their occurrence or long term persistence, the future prospects are only rated as *unfavourable-inadequate* (Table 112C).

Overall the EU conservation assessment for both strandline communities is *unfavourable-inadequate* (Table 112C), owing to the relative scarcity and extent of either habitat. Under the proposed Irish conservation assessment scheme, they are considered to be *unfavourable-unchanged*.


SAC 1482
Habitats
Strandline
Strandline - shingle
Embryonic Dune
Mobile Dune
Fixed Dune
Machair
Scrub
Saltmarsh
Saltmarsh (+ Juncus maritimus)
Amenity grassland
Agricultural land
Other (Undefined)
Coastal Monitoring Project 2004-2006
Rossmurrevagh
CMP code: 112
0 100 200 300 400 500 Meters
Clew Bay Complex (SAC 1482)
This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated areas are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 5953)
Date of production: 25/11/2008
Map version: 1
Original Drawing Size: 297 x 420 (A3)
Scale 1:12993
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