

Galway Bay Complex SAC (site code 268)
Conservation objectives supporting document
-coastal habitats

NPWS

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Please note that the opinions expressed in the site reports from the Saltmarsh Monitoring Project are those of the authors and do not necessarily reflect the opinion or policy of NPWS.

Please note that this report should be read in conjunction with the following report: NPWS (2013) Conservation Objectives: Galway Bay Complex SAC 000268. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

1 Introduction

Achieving Favourable Conservation Status (FCS) is the overall objective to be reached for all Annex I habitat types and Annex II species of European Community interest listed in the Habitats Directive 92/43/EEC (Commission of the European Communities, 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.

Galway Bay Complex is a very large, marine-dominated site situated on the west coast of Ireland. The inner part of the south bay is protected from exposure to Atlantic swells by the Aran Islands and Black Head. Subsidiary bays and inlets (e.g. Poul-na-clough, Aughinish and Kinvara Bays) add texture to the patterns of water movement and sediment deposition which lends variety to the marine habitats and coastal communities. The terraced Carboniferous (Visean) limestone platform of the Burren sweeps down to the shore and in to the sublittoral. West of Galway city, the bedrock is granite. The long shoreline is noted for its diversity, with complex mixtures of bedrock shore, sea cliffs, shingle beach, sandy beach and fringing saltmarshes.

Good quality saltmarshes of both Atlantic and Mediterranean types are well represented and occur along with perennial vegetation of stony banks.

Galway Bay Complex SAC (site code: 268) is designated for a range of coastal habitats including vegetated shingle and saltmarsh. The following four coastal habitats are included in the qualifying interests for the site:

- Perennial vegetation of stony banks (1220)
- *Salicornia* and other annuals colonising mud and sand (1310)
- Atlantic salt meadows (*Glauco-Puccinellietalia maritima*) (1330)
- Mediterranean salt meadows (*Juncetalia maritima*) (1410)

The first habitat represents vegetated shingle; the remainder are saltmarsh habitats, which may be found in close association with each other. The known distribution of shingle sites in Galway Bay Complex SAC is presented in Appendix I, while the distribution of saltmarsh habitats is presented in Appendix II.

This backing document sets out the conservation objectives for the four coastal habitats listed above in Galway Bay Complex SAC, which are defined by a list of parameters, attributes and targets. The main parameters are (a) Range (b) Area and (c) Structure and Functions, the 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** are based primarily on the findings of the National Shingle Beach Survey (NSBS), which was carried out in 1999 on behalf of the National Parks and Wildlife Service (NPWS) (Moore & Wilson, 1999).

The NSBS visited the following three sub-sites within Galway Bay Complex SAC (see Appendix I for distribution map):

1. Rinville Point (a broad vegetated spit below Rinville Golf Course and Country Club on the eastern shore of Galway Bay)
2. Tawin Point (situated on the eastern shore of Galway Bay)
3. Coastline from Blackhead to Carrickada (along the southern shore of Galway Bay in County Clare)

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. Tawin Point was rated of 'high interest' due to the presence of a population of yellow horned poppy *Glaucium flavum*, while Rinville Point and coastline from Blackhead to Carrickada were rated of 'medium interest'. 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.

Some vegetated shingle was also recorded during the Coastal Monitoring Project (Ryle *et al.*, 2009). Small areas of the habitat were found at two dune sub-sites located within Galway Bay SAC: Bishopsquarter and Barna (Whitestrans).

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. As part of the SMP detailed individual reports and habitat maps were produced for each sub-site. The relevant reports and habitat maps for the sub-sites surveyed within Galway Bay Complex SAC are presented in the Appendices at the end of this report.

The SMP surveyed, mapped and assessed a total of ten sub-sites within Galway Bay Complex SAC (McCorry, 2007; McCorry & Ryle, 2009):

1. Barna House (Appendix III)
2. Seaweed Point (Appendix IV)
3. Roscam West and South (Appendix V)
4. Oranmore North (Appendix VI)
5. Kilcaimin (Appendix VII)
6. Tawin Island (Appendix VIII)
7. Tyrone House-Dunbulcaun Bay (Appendix IX)
8. Kileenaran (Appendix X)
9. Kinvarra West (Appendix XI)
10. Scanlan's Island (Appendix XII)

The conservation objectives for the saltmarsh habitats in Galway Bay Complex 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 almost 45% of the total area of saltmarsh within Galway Bay Complex SAC.

Two sandy systems occur at Bishopsquarter and Barna, which are also located within the SAC, however no dune habitats are listed as qualifying interests for the site. At Barna, there is no dune system as such, but the coastline at this sub-site is composed of shingle or cobble substrates and a narrow band of perennial strandline vegetation was recorded by Ryle *et al.* (2009).

Vegetated sea cliffs were also recorded during the Irish Sea Cliff Survey (ISCS) by Barron *et al.* (2011) within Galway Bay Complex SAC from Rusheen Bay. This habitat is not a qualifying interest for this site.

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 Galway Bay Complex 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) Area, (b) Range and (c) Structure and Functions.

3.2 Area

3.2.1 Habitat extent

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target 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.

Shingle beaches are known to occur throughout Galway Bay Complex SAC, although the exact current extent of this habitat is unknown. The National Shingle Beach Survey recorded this habitat from Rinville Point, Tawin Point and Coastline from Blackhead to Carrickada, but did not map the extent (Moore & Wilson, 1999). The CMP also recorded perennial vegetation on shingle at Barna and Bishopsquarter (Ryle *et al.*, 2009).

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.

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 Galway Bay shoreline supports good examples of shingle beaches along the more exposed shores to the south and west of Galway City and to the north east of Finnera, County Clare. 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 Galway Bay is known to support a typical flora for this habitat.

The shingle at Tawin Point is described as a vegetated shingle ridge. The substrate is stony to sandy, with associated habitat intertidal shingle present. Species present include yellow horned poppy (*Glaucium flavum*), pellitory-of-the-wall (*Parietaria judaica*), curled dock (*Rumex crispus*). The presence of lichens was noted.

The other shingle sites within the Galway Bay Complex support typical species such as spear-leaved orache (*Atriplex prostrata*), sea beet (*Beta vulgaris*), common cleavers (*Galium aparine*), sea milkwort (*Glaux maritima*), wild radish (*Raphanus raphanistrum* ssp *raphanistrum*), sea campion (*Silene uniflora*) and sea mayweed (*Tripleurospermum maritimum*). Lichens were also noted in shingle along the coastline from Black Head to Carrickada, indicating long-term stability.

McCorry and Ryle (2009) recorded sea purslane (*Atriplex portulacoides*) associated with vegetated shingle/gravel/cobble bank to the east of Barna House which occurs within the NSBS site of Spiddle beach to Ballymoneen. This species is mainly distributed along the east coast of Ireland and is only found in six 10km² squares along the west coast (Preston *et al.* 2002).

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 maritima*) (1330)
- Mediterranean salt meadows (*Juncetalia maritimi*) (1410)
- Mediterranean and thermo-Atlantic halophilous scrub (1420)

Salicornia mudflats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM) are the saltmarsh habitats listed as Qualifying Interests for Galway Bay Complex SAC. Detailed descriptions of each habitat in the 10 sub-sites recorded during the Saltmarsh Monitoring Project (SMP) by McCorry (2007) and McCorry and Ryle (2009) in Galway Bay Complex SAC can be found in Appendices III to XII.

4.1 Overall Objectives

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

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

The overall objective for 'Mediterranean salt meadows' in Galway Bay Complex 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 and Ryle (2009). Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is assessed subject to natural processes, including erosion and succession.

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

The total areas of each saltmarsh habitat within the SAC and the total area of the habitat within each sub-site as mapped by the SMP are presented in the following 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 Galway Bay Complex 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.

Baseline habitat maps were produced for the saltmarsh in Galway Bay during the SMP. These maps are included with the individual site report in an Appendix at the end of this document. A total of 127.44ha of saltmarsh habitat was mapped by the SMP within the SAC at the four sub-sites and an additional 157.59ha of potential saltmarsh habitat was identified using aerial photographs, to give a total estimated area of 285.03ha for the SAC.

The total area of each saltmarsh habitat within the SAC and the total area of each habitat within the site as mapped by the SMP are presented in the following tables. The target for each habitat is outlined below the relevant table.

Sub-site	Total area (ha) of <i>Salicornia</i> mudflats (excluding mosaics) from SMP	Total area (ha) of <i>Salicornia</i> mudflats within SAC boundary (including mosaics)
Barna House	0.067	0.067
Seaweed Point	0.003	0.003
Roscam West and South	0.023	0.023
Oranmore North	-	-
Kilcaimin	0.015	0.015
Tawin Island	1.08	1.098
Tyrone House-Dunbulcaun Bay	-	-
Kileenaran	0.008	0.007
Kinvara West	0.018	0.017
Scanlan's Island	0.113	0.117
Total	1.327	1.347
Potential habitat	-	-
Total	1.327	1.347

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

Sub-site	Total area (ha) of ASM (excluding mosaics) from SMP	Total area (ha) of ASM within SAC boundary (including mosaics)
Barna House	2.24	2.328
Seaweed Point	1.42	1.411
Roscam West and South	3.30	3.303
Oranmore North	4.84	4.241
Kilcaimin	7.82	6.816
Tawin Island	38.33	53.854
Tyrone House-Dunbulcaun Bay	9.93	9.832
Kileenaran	15.12	15.366
Kinvara West	13.30	13.333
Scanlan's Island	4.46	4.132
Total	100.76	114.616
Potential habitat	149.18	149.18
Total	249.94	263.796

In view of the recent loss of 0.3ha of ASM habitat at Oranmore North due to infilling and coastal defence works, the target for Atlantic salt meadows is that the area should be increasing, subject to natural processes, including erosion and succession.

Sub-site	Total area (ha) of MSM (excluding mosaics) from SMP	Total area (ha) of MSM within SAC boundary (including mosaics)
Barna House	0.418	0.282
Seaweed Point	0.948	0.931
Roscam West and South	-	-
Oranmore North	-	-
Kilcaimin	0.503	0.005
Tawin Island	1.53	1.799
Tyrone House-Dunbulcaun Bay	8.409	8.184
Kileenaran	0.271	0.271
Kinvara West	-	-
Scanlan's Island	-	-
Total	12.079	11.472
Potential habitat	8.415	8.415
Total	20.494	19.887

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

4.3 Range

4.3.1 Habitat distribution

Saltmarsh is currently known to display a wide distribution throughout the site with concentrations at Tawin Island and Tyrone House-Dunbulcaun Bay. 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 Kilcaimin, Barna House and Tawin Island.

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

4.4 Structure and Functions

The location, character and dynamic behaviour of saltmarshes are governed by sediment supply, tidal regime, wind-wave climate and sea level change. The slope of the saltmarsh allows the development of several ecological gradients such as tidal submergence and salinity, and this influences the development of distinctive zones of halophytic and salt tolerant plant communities. Maintaining the favourable conservation condition of the saltmarsh habitat in Galway 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 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 Galway 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 coastal habitats, including transitional zones, subject to natural processes, including erosion and succession.

4.4.5 Vegetation structure: vegetation height

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

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 Galway 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
<i>Salicornia</i> spp.	<i>Puccinellia maritima</i>	<i>Festuca rubra</i>
<i>Suaeda maritima</i>	<i>Triglochin maritima</i>	<i>Juncus gerardii</i>
<i>Puccinellia maritima</i>	<i>Plantago maritima</i>	<i>Armeria maritima</i>
<i>Aster tripolium</i>	<i>Atriplex portulacoides</i>	<i>Agrostis stolonifera</i>
	<i>Aster tripolium</i>	<i>Limonium humile</i>
	<i>Spergularia</i> sp.	<i>Glaux maritima</i>
	<i>Suaeda maritima</i>	<i>Seriphidium maritimum</i>
	<i>Salicornia</i> spp.	<i>Plantago maritima</i>
	<i>Glaux maritima</i>	<i>Aster tripolium</i>
	Turf fucoids	<i>Juncus maritimus</i>
		<i>Triglochin maritima</i>
		<i>Blysmus rufus</i>
		<i>Eleocharis uniglumis</i>
		<i>Leontodon autumnalis</i>
		<i>Carex flacca</i>
		<i>Carex extensa</i>
		Turf fucoids

Species of local distinctiveness were recorded at a number of subsites throughout the cSAC. At sub-sites Seaweed Point, Barna House, Kilcaimin and Scanlan's Island, Sea Purslane (*Atriplex portulacoides*) was recorded. This species is mainly distributed along the eastern coast of Ireland and is only found in six 10km² squares along the west (McCorry & Ryle 2009).

At subsite Roscam West and South, Sea Wormwood (*Seriphidium maritimum*) is a species of local distinctiveness (McCorry & Ryle 2009).

At subsites Tyrone House-Dunbulcaun Bay, Kinvara West and Kileenaran, both Sea Purslane (*Atriplex portulacoides*) and Sea Wormwood (*Seriphidium maritimum*) were recorded (McCorry & Ryle 2009).

4.4.8 Vegetation composition: negative indicator species

The only invasive and non-native species recorded on saltmarshes during the SMP was common cordgrass (*Spartina anglica*). This species was neither recorded in Galway Bay Complex SAC by the SMP (Ryle *et al.*, 2009) nor by Preston *et al.* (2002).

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

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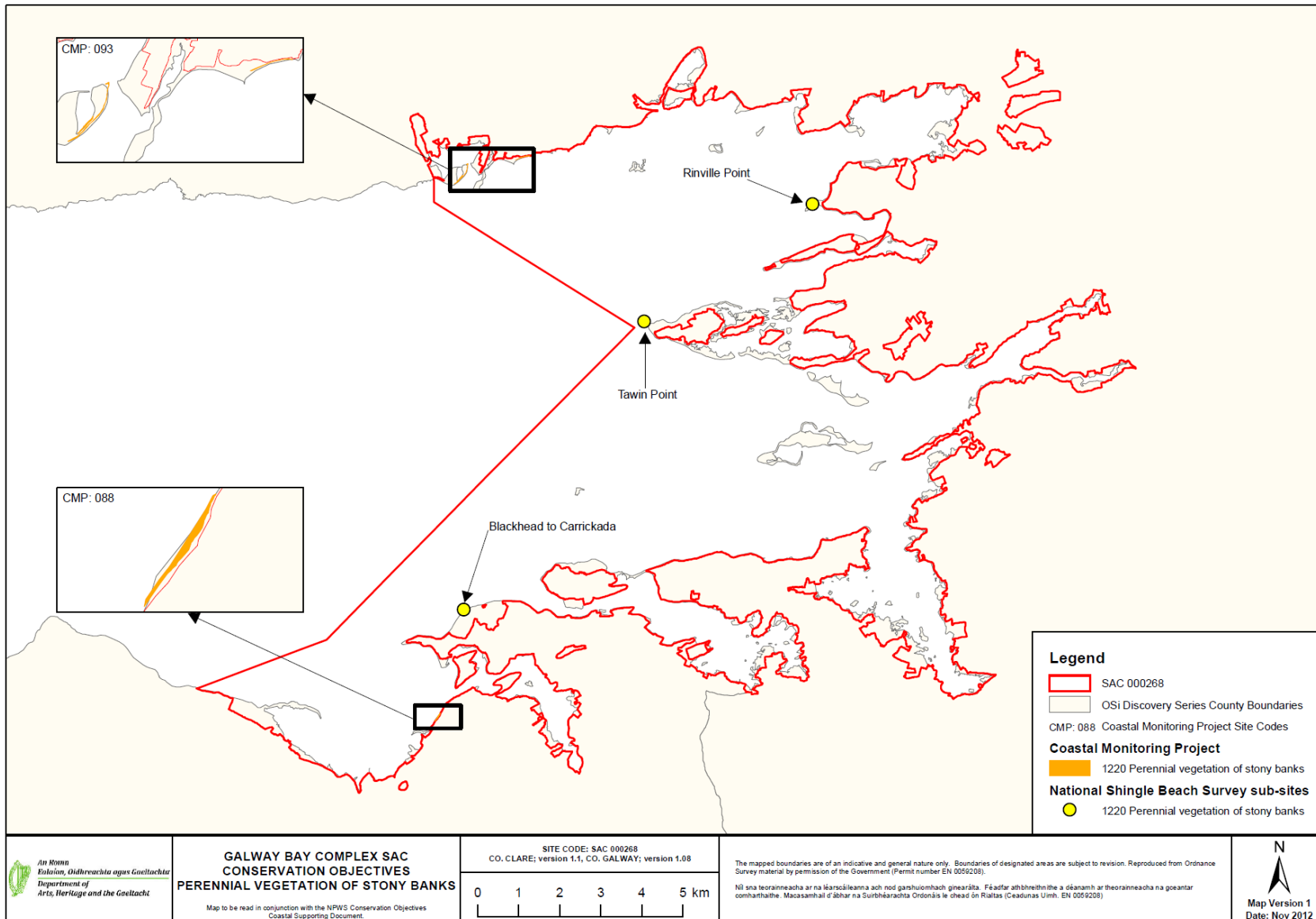
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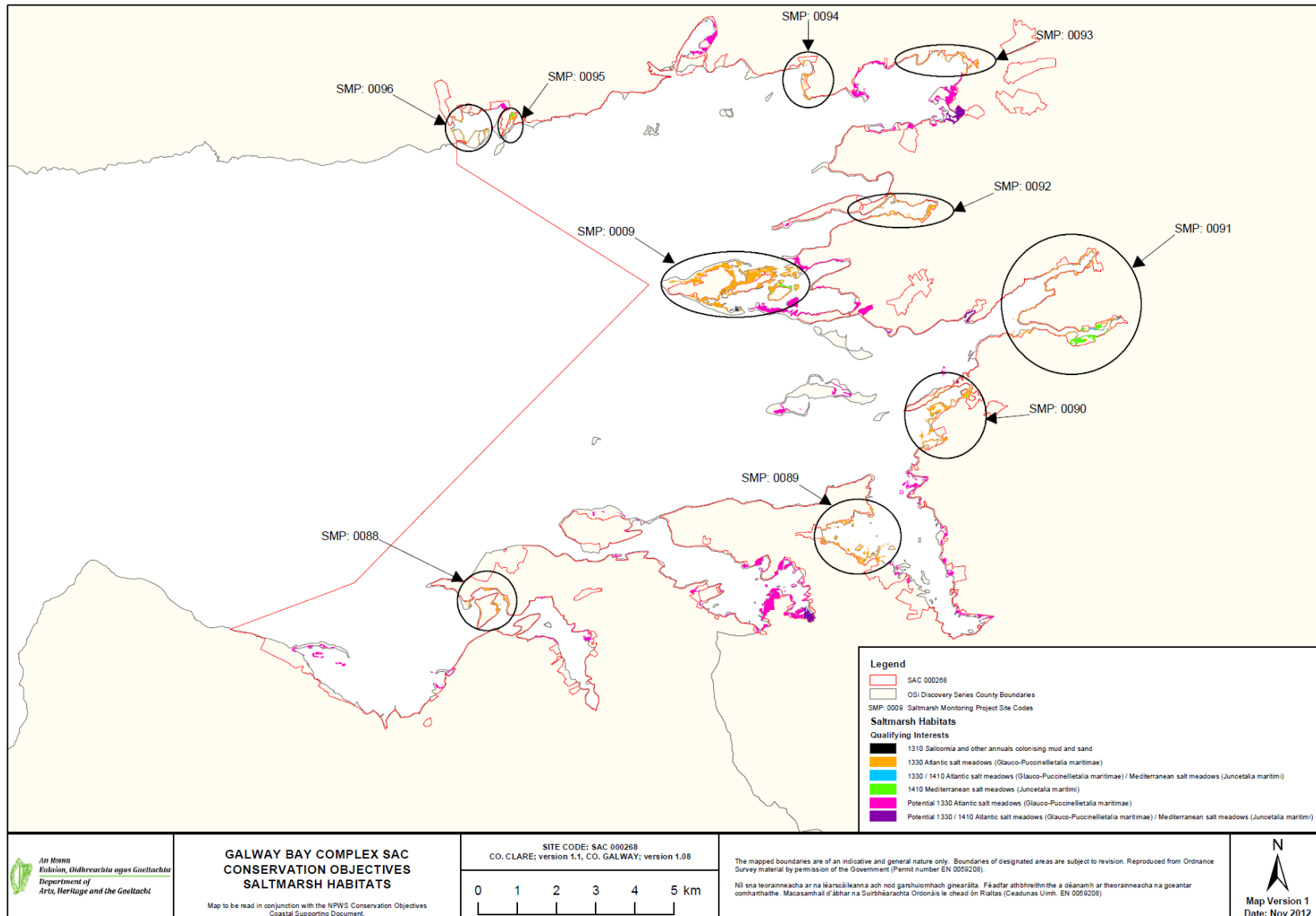
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Appendix I – Known distribution of shingle sites in Galway Bay Complex SAC



Appendix II – Distribution of saltmarsh habitats in Galway Bay Complex SAC.



Appendix III – Barna House site report and habitat map from the Saltmarsh Monitoring Project (McCorry and Ryle, 2009)

1 SITE DETAILS

SMP site name: Barna House	SMP site code: SMP0096
Dates of site visit 29/10/2007	CMP site code: N/A
SM inventory site name: Barna House	SM inventory site code: 113
NPWS Site Name: Galway Bay Complex	
NPWS designation cSAC: 000208	MPSU Plan: old format plan available
pNHA: 000208	SPA: 004031
County: Galway	Discovery Map: 45 Grid Ref: 125000, 223000
Aerial photos (2000 series): O 3407-C,D; O 3469-A	6 inch Map No: Ga093
Annex I habitats currently listed as qualifying interests for Galway Bay Complex cSAC:	
H1310 <i>Salicornia</i> and other annuals colonizing mud and sand	
H1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	
H1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	
Other SMP sites within this SAC/NHA: Scanlan's Island, Kinavarra West, Kileenaran, Tyrone House-Dunbeacon Bay, Kilcaimin, Oranmore North, Roscom West and North, Seaweed Point	
Saltmarsh type: Bay	Substrate type: Mud

2 SITE DESCRIPTION

This site is located along the north side of Galway Bay and is situated between Salthill and Barna Village. A relatively large area of intertidal flats is present in a sheltered bay called White Strand (or Rusheen Estuary) and is protected from Galway Bay by a narrow low-lying peninsula in Derryloney Townland that connects a taller hill (Knockagoneen) with a smaller vegetated shingle/gravel/cobble bank further east. The tall hill is eroding and a cliff face has developed along the seaward side. A mixed sandy sediment and storm beach known as Silver Strand is situated along the seaward side of this peninsula. Several streams flow into the White Strand. The east side of White Hill is protected by Blakes Hill. There is only a small opening into the White Strand at the south-east corner.

Saltmarsh is distributed around the shoreline of White Strand, with some larger patches developing in more sheltered flatter areas. The immediate terrestrial zone around the Silver Strand is relatively un-developed, but there is significant urban development in the area. The Silver Strand beach on the peninsula has been developed by Galway Council into an important local amenity area. A minor road located along the west side of the bay/estuary accesses the Silver Strand beach and amenity area. The grassland on the Silver Strand (Derryloney) peninsula is grazed, as is the adjacent hill. Most of the saltmarsh around the shoreline of the Silver Strand was surveyed apart from the section within Rusheen Townland at the north-east corner of the bay.

The site is located within the Galway Bay Complex candidate Special Area of Conservation (cSAC 208). Three Annex I habitats are present at this site, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). All these habitats are listed as qualifying interests for the Galway Bay Complex cSAC. Most of the saltmarsh habitats mapped at this site is located within the cSAC boundary. There are several fragments of Annex I habitats located outside the boundary around the site. Some are unintentional exclusions, as the 6 inch map was used to draw the cSAC site boundary and there are some errors between this map and the actual ground as indicated from the aerial photos. Some of these habitat fragments are found in adjacent fields excluded from the cSAC.

Sea Purslane (*Atriplex portulacoides*) is one species of local distinctiveness that is present at this site and is associated with the vegetated shingle/gravel/cobble bank located at the east of the site. This species is mainly distributed along the eastern coast of Ireland and is only found in six 10 km² squares along the west coast (Preston *et al.* 2002).

Part of the western side of this site (Lenarevagh Townland) is included within the Bearna Local Area Plan Strategic Environmental Assessment (CAAS Environmental Services 2007). This report notes the presence of saltmarsh habitat in the Rusheen Estuary where the Lenarevagh Stream reaches the tidal zone. This area was also surveyed as part of the Galway City Habitat Inventory (Natura 2006).

The southern part of the site was accessed from the car park along the beach. The area to the east is fenced off and marked private land. The north-western part of the site was accessed from a new park developed by Galway County Council.

3 SALTMARSH HABITATS

3.1 General description

There are several patches of saltmarsh surveyed at this site. Atlantic salt meadow is the most dominant Annex I saltmarsh habitat (Table 3.1). This site, due to the diverse landscape around the bay/estuary also increases the diversity of the saltmarsh topography and its transitions to terrestrial habitats. The largest area of ASM is found along the landward side of the stony bank at the south-western section of the site. There are narrow bands of this habitat around much of the shoreline of the southern section of White Strand. Some of these bands could be classified as ASM/rocky mosaic, as there are frequent loose rocks and exposed rock scattered over the saltmarsh strip. These bands have developed on thin bands of sediment that are eroding in places and rocks and cobbles are frequently exposed.

The ASM transitions at its upper boundary to upper saltmarsh dominated by Twitch (*Elytrigia repens*) and then to dry coastal grassland (GS1) on the vegetated gravel/cobble bar to the south-east. The vegetation dominated by Twitch has been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. A fence, stone wall or hedge occurs along the landward edge of the narrow bands of ASM around the tall hill. The north-western section of ASM transitions to small amounts of dry coastal grassland or CM2 dominated by Twitch, although much of the terrestrial area has been modified to create a new park. Atlantic salt meadow transitions to dry and wet grassland along the south-west grazed section of the site. The ASM generally transitions at its lower boundary to mixed gravely sediment and onto the intertidal mud and sand flats.

Mediterranean salt meadow habitat is found along the western side of the site where the Lenarevagh Stream reaches the tidal zone. A bridge has been built over the stream to access the Silver Strand beach and this divides the saltmarsh habitats. There is a narrow band of MSM saltmarsh habitat extending west along the edges of the stream and also along several drainage channels before this vegetation transitions into wet grassland. The area east of the road bridge contains MSM and brackish habitat dominated by Sea Club-rush. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. This area is cut off from the rest of the estuary by a small seawall and culvert that may have been used as an old footbridge in the past. A narrow band of MSM occurs along the shoreline in the north-west corner of the estuary and there is a small of Common Reed in this area.

Small patches of *Salicornia* flats are found along the southern side of the White Strand adjacent to ASM habitat in sheltered areas. One small patch is located at the tip of the vegetated cobble bar in a sheltered pan or hollow within the ASM.

Table 3.1. Area of saltmarsh habitats mapped at Barna House.

EU Code	Habitat	Area (ha)
1310	<i>Salicornia</i> and other annuals colonizing mud and sand	0.067
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	2.240
1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	0.418
	Total	2.725

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

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

This habitat is found at several locations around the southern part of the site. This habitat only occurs in very small patches. It mainly occurs on muddy sediment or mixed sediment along the seaward side of the ASM. The patches of 1310 *Salicornia* flat habitat are dominated by Glasswort (*Salicornia europaea*) and occur on mud or occasionally on mixed sediment. The largest area is located at the south-west corner of Knockagoneen Hill and is only 5 m wide at its widest point.

This habitat also occurs in several small pans or hollows containing mud (< 5m²) at the tip of the shingle/cobble bank. The patches contain a sward of Glasswort with no other species present. There is a definite boundary between the 1310 vegetation and the ASM around the edge of the pans.

3.3 Atlantic salt meadows (H1330)

This is the most dominant Annex I saltmarsh habitat on the site. It is also quite variable, which is to be expected on a site where the saltmarsh habitat is quite spread out over a relatively large distance, occurring in different situations. Several typical ASM vegetation communities are present and there are also mosaics with MSM habitat. The largest portions of habitat occur along the gravel/cobble bank and along the inner part of the southern peninsula.

The inner sheltered part of the gravel/cobble bank has a narrow band of ASM that widens out towards the tip. The narrow band is on a relatively steep slopes and displays typical zonation with Common Saltmarsh-grass dominated at the seaward edge and Red Fescue (*Festuca rubra*) dominating towards the upper landward edge. Other species present in the lower community includes Lax-flowered Sea Lavender (*Limonium humile*), Glasswort, Annual Sea-blite (*Suaeda maritima*), Sea Aster (*Aster tripolium*) and Greater Sea-spurrey (*Spergularia media*). The upper saltmarsh community contains Sea Plantain (*Plantago maritima*), Common Scurvygrass (*Cochlearia officinalis*). Creeping Bentgrass (*Agrostis stolonifera*) also occurs close to the upper saltmarsh boundary.

Sea Purslane, while rare on the site, is relatively abundant on the gravel/cobble bar to the south-east. This bar is fenced off from the adjacent hill and is not grazed, which may be influencing the abundance of this species.

There is an accretion ridge along part of this seaward boundary, indicating some very minor saltmarsh growth, although towards the tip a low saltmarsh cliff (0.4 m high) develops along the seaward boundary and there are signs of erosion. The saltmarsh topography in this section is poorly developed. The saltmarsh vegetation is more complex at the tip of the shingle/cobble bank and a typical mid-marsh zone *Armeria-Plantago* sward has developed. This area contains some saltmarsh pans. The saltmarsh in this area has been grazed lightly.

A narrow (2-3 m wide) fragmented strip of rocky ASM occurs around the large hill (Knocknagoneen). There are frequent signs of erosion with patches of vegetation on sediment overlaying rocks and cobbles.

The ASM located at the south-west corner of Knocknagoneen Hill also has an accretion ridge on a shallow slope where pioneer ASM transitions to 1310 *Salicornia* flats. The pioneer ASM contains scattered patches of Common Saltmarsh-grass and rare Lax-flowered Sea Lavender. The ASM continues west along the shoreline around a low-lying area of wet grassland, dry grassland and scrub. An old dry stone wall is situated along the lower saltmarsh boundary. The upper boundary of the ASM communities is sometimes difficult to distinguish as this area was heavily grazed. There is an interior network of low-lying channels and mounds in the inner section, creating a variety of habitats. There are also several drains in this area. The inner part of this section was not examined in detail due to livestock on the site. There may be some saltmarsh influence along some of these drains.

Atlantic salt meadow habitat is also located along the north side of the estuary, with a low saltmarsh cliff along the seaward boundary. This area also has developed a typical short *Armeria-Plantago* sward in a relatively flat section and is possibly grazed by wildfowl. This relatively flat area has also developed some typical mid marsh saltpans and small creeks. An additional ASM community with Saltmarsh Rush, Sea Plantain and Red Fescue has developed along the landward transition of this area of saltmarsh. The upper saltmarsh boundary is marked by an old wall and grassy bank in places.

3.4 Mediterranean salt meadows (H1410)

This habitat is mainly located at the west side of the site on either side of the small road that accesses Silver Strand beach and car park. This area contains very soft mud and is cut off from the main part of Rusheen Estuary bay an old seawall with a culvert. The tides influence this low-lying area containing a small section of bare mud and adjacent saltmarsh.

The MSM habitat on the east of the road contains dense sward of Sea Rush with few other species on soft mud. There are occasional open patches in the MSM with Common

Saltmarsh-grass with Sea Aster. The Sea Rush appears to be spreading into the bare mud section near the channels. Other species such as Common Scurvygrass, Saltmarsh Rush, Creeping Bent, Sea Milkwort, Red Fescue and Silverweed (*Potentilla anserina*) appear closer to the roadside and the edges of the MSM. This section has been badly poached in the past with significant bare mud present with the MSM, although the vegetation has now recovered somewhat.

The habitat is brackish in places and patches of Sea Club-rush (*Bolboschoenus maritimus*) develop along some of the open bare mud area on the northern side of the channel. A diverse transitional vegetation community influenced by freshwater seepage and containing Sea Rush, Sea Club-rush, Autumn Hawkbit (*Leontodon autumnalis*), Curled Dock (*Rumex crispus*), Brookweed (*Samolus valerandi*), White Clover (*Trifolium repens*), with patches dominated by Creeping Bent and Red Fescue has developed to the north of the central channel. This habitat transitions to wet grassland with a greater freshwater influence higher up the shoreline slope.

Mediterranean salt meadow habitat also occurs along the north-western shoreline. This habitat is relatively narrow and diverse in places with fragments of ASM interspersed with patches dominated by Sea Rush and creating a mosaic. The MSM vegetation is therefore more diverse and also contains species such as Sea Plantain and Common Scurvygrass. Some zonation within the MSM is evident and is seen in the other ASM species. The MSM habitat encroaches behind on old dry stone wall marking an old field boundary. This habitat is rocky in places. Further north the habitat transitions to a band of Common Reed.

The tidal influence extends further west of the road by a culvert under the road and Sea Rush and Sea Club-rush is distributed along the sides of a small drain/stream. The habitat on the west side of the road is not grazed or is only grazed lightly.

4 IMPACTS AND ACTIVITIES

Several impacts and activities affect this site with a range of intensities (Table 4.1). Some parts of the site are grazed lightly (140), while other sections have been damaged by poaching and overgrazing (143). A path used by walkers and grazing animals accessing the tip of the shingle/cobble bank crosses some of the saltmarsh (501).

Erosion (900) at the site is not significant. Some of the lower saltmarsh boundaries have low saltmarsh cliffs, but this is typical of this sort of sheltered site. The impact of erosion is assessed as neutral. There are also signs of accretion (910) along the lower ASM boundary at several locations around the site. A comparison of the OSI 2nd edition 6 inch map to the OSI 2000 series aerial photos shows that there have been no significant changes along the edge of the saltmarsh. The position of the shingle/cobble bank has changed somewhat at its tip in the past 100 years, with some minor losses and gains to the saltmarsh. Accretion is still continuing but there has been no measurable growth of saltmarsh in the current monitoring period.

Impacts and activities adjacent to the site include urbanization (401), amenity use of the Silver Strand beach (629) and grazing of livestock (140). These activities have little or no measurable impact on the saltmarsh habitats. Toilet facilities are situated adjacent to the Silver Strand car park and beach amenity area and there is some runoff of sewage from these buildings into the estuary that affects the saltmarsh at this location (701). There is a quarry

situated on Knocknagoneen Hill and some work related to the quarry has disturbed part of the narrow strip of ASM around the hill (301).

Table 4.1. Intensity of various activities on saltmarsh habitats at Barna House.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1310	140	C	0	0.067	Inside
1330	140	B	0	1.477	Inside
1330	143	B	-1	0.763	Inside
1330	501	C	0	0.010	Inside
1330	622	C	0	0.010	Inside
1330	900	C	0	0.05	Inside
1330	910	C	+1	0.12	Inside
1410	143	B	-1	0.418	Inside
1410	900	C	0	0.01	Inside
1330	701	C	-1	0.100	Outside

¹ EU codes as per Interpretation Manual.

² Description of activity codes are found in Appendix III, Summary Report 2007-2008.

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

⁴ Impact is rated as -2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence.

⁵ Location of activity: Inside = activities recorded within and directly impacting the saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

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

The overall conservation status of this site is *unfavourable-bad* (Table 5.1). The main activity affecting the site is poaching and over-grazing and this activity affects part of the site. Barna House saltmarsh is a relatively small site but with several features of interest such as, the presence of typical saltmarsh vegetation and topography, natural transitions to other coastal habitats including a shingle/cobble bar and natural transitions to diverse brackish vegetation. A species of local distinctiveness (Sea Purslane) is present on the site. Three monitoring stops failed out of ten total stops. The saltmarsh is protected from significant erosion by the shelter of the estuary (White Strand). The area is an important amenity site, although the saltmarsh habitats are not affected by this use directly (apart from runoff from the toilet facilities on the site).

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are poor-moderate. There is some scope for landward transition of saltmarsh

vegetation up slope into wet grassland vegetation in the western part of the site. The rest of the saltmarsh has steeper slopes along the upper boundaries (on the shingle/cobble bank) or has hard upper boundaries. However, these are very general predictions.

This site is located within the Galway Bay Complex cSAC. An old format NPWS management plan is available for the saltmarsh habitats at this cSAC but it is now out of date.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Barna House.

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

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

5.2.1 Extent

The extent of this habitat is assessed as *favourable*. This habitat is distributed at several locations along the edge of the ASM and is also found in several small patches in pans within the ASM. There are no indications of any loss of habitat due to erosion or to land-use changes. There are no indications that this habitat was more extensively distributed over the intertidal mud and sand flats of the White Strand/Rusheen Estuary.

5.2.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. No monitoring stops were carried out in this habitat due to the small extent in total. However, a visual assessment of the habitat indicated that it would probably pass for all attributes. Two ecotypes were present with Glasswort filling some of the small muddy pans on the saltmarsh and several patches also occurring adjacent to the seaward boundary of the ASM. There are natural transitions along a shallow slope from adjacent ASM to 1310 *Salicornia* flats.

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 few impacts or activities affecting this habitat at this site, although a small extent is present. Continuing accretion at several locations where there are accretion ridges may increase the extent of this habitat in the future.

5.3 Atlantic salt meadows (H1330)

5.3.1 Extent

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

Small positional changes at the tip of the shingle/cobble bar have led to some gains and losses of saltmarsh habitat in the past 100 years. However, these largely compensate each other and are not assessed as they occurred outside the current monitoring period.

5.3.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-bad*. Seven monitoring stops were carried out in this habitat and two failed. Most of the attributes required for the structure and functions of this habitat reached their targets. The main reason for the failed stops was overgrazing and poaching damage. Several typical ASM communities were recorded on this site and zonation was evident with upper mid and lower zone saltmarsh communities. In addition some pioneer saltmarsh vegetation is present at this site. The saltmarsh topography is moderately well-developed. There are natural transitions to other coastal habitats at both the lower and upper saltmarsh boundaries. The Atlantic salt meadows form part of a larger coastal ecosystem.

Sea Purslane is also present at this site and was recorded at two locations. This is another species of local distinctiveness. This species is mainly distributed along the eastern coast of Ireland and is only found in six 10 km² squares along the west coast. Curtis and Sheehy-Skeffington (1998) have discussed the distribution of this species and hypothesised that its lack of abundance on the west coast compared to the east coast is related to the higher levels of grazing on west coast saltmarshes. The lack of grazing on some of the saltmarshes in Galway Bay may be one of its reasons for its presence on saltmarshes in Galway Bay.

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 such as grazing continue in the near future. Overgrazing and poaching is the main activity affecting part of the ASM at this site. There are few other impacts or activities significantly affecting this site. There are few prospects for the loss of habitat due to erosion in the future. The site is within a cSAC so the habitat should not be affected by land-use changes such as development.

5.4 Mediterranean salt meadows (H1410)

5.4.1 Extent

The extent of this habitat is assessed as *favourable*. There are no indications of any loss of habitat due to erosion or to land-use changes within the current monitoring period. Only a small area of this habitat was recorded at this site, although it is more frequent at other saltmarshes around Galway Bay.

5.4.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Three monitoring stops were carried out in this habitat and one failed. Most of the attributes required for the structure and functions of this habitat reached their targets. The main reason for the failed stop was overgrazing and poaching damage. The species composition of this was typical of this habitat. Some zonation was noted in the habitat and this was noted from other saltmarsh species. There are also mosaics present with ASM and diverse transitional communities with brackish habitats. The topography was poorly developed, but this is typical of a small patch of habitat.

5.4.3 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 such as grazing continue in the near future. Overgrazing and poaching is the main activity affecting part of the MSM at this site. There are few other impacts or activities significantly affecting this site. There are few prospects for the loss of habitat due to erosion in the future. The site is within a cSAC so the habitat should not be affected by land-use changes such as development.

6 MANAGEMENT RECOMMENDATIONS

There are no specific management recommendations for the Annex I saltmarsh habitats present at this site. The area of saltmarsh affected by overgrazing and poaching is relatively small.

7 REFERENCES

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8 APPENDIX I

Table 8.1. Areas of SMP habitats mapped using GIS.

SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 <i>Salicornia</i> flats	0.067	0.067				
2	Spartina swards						
3	1330 Atlantic salt meadow	2.073		2.073			
4	1410 Mediterranean salt meadow	0.350			0.350		
5	ASM/MSM mosaic (50/50)	0.136		0.068	0.068		
6	ASM/ <i>Spartina</i> mosaic						
7	1330/other SM (CM2) mosaic						
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	0.443					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)						
11	Isolated <i>Spartina</i> clumps on mud (5%)						
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic						
14	<i>Spartina</i> sward dominated, with some ASM						
15	1310/ <i>Spartina</i> mosaic						
16	ASM dominated with some <i>Spartina</i>						
17	1330/sand dune mosaic						
18	Other SM (CM2)	0.396					
19	1330/rocky shore mosaic	0.198		0.099			
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
Total		3.663	0.067	2.240	0.418		



Legend

- SAC Boundary
- 1310 Salicornia flats
- 1330 Atlantic salt meadows
- 1410 Mediterranean salt meadows
- 1330/1410 mosaic
- 1330/rocky shore mosaic
- Other Saltmarsh (CM2)
- other
- 1330 monitoring stops
- 1410 monitoring stops

<p style="font-size: small;">Comhaltas, Oidreamh agus Idiras Árainn Bhrúnaíocht, Meiteolaíocht agus Idiras Árainn National Parks and Wildlife Service</p>	Saltmarsh Monitoring Project	Barna	SMP code: SMP0096		N
	2007-2008	Galway Bay Complex SAC (000268)	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: 8953)	Date of production: 20/02/2009 Map version: 1	Original Drawing Size: 297 x 420 (A3) Scale 1:3500

Appendix IV – Seaweed Point site report and habitat map from the Saltmarsh Monitoring Project (McCorry & Ryle, 2009)

1 SITE DETAILS

SMP site name: Seaweed Point	SMP site code: SMP0095
Dates of site visit 09/10/2007	CMP site code: N/A
SM inventory site name: Seaweed Point	SM inventory site code: 115
NPWS Site Name: Galway Bay Complex	
NPWS designation cSAC: 000208	MPSU Plan: old format plan available
pNHA: 000208	SPA: 004031
County: Galway	Discovery Map: 45 Grid Ref: 126000, 223000
Aerial photos (2000 series): O 3406-D; O 3407-C,D; O 3469-A,B	6 inch Map No: Ga093, Ga094
Annex I habitats currently listed as qualifying interests for Galway Bay Complex cSAC:	
H1310 <i>Salicornia</i> and other annuals colonizing mud and sand	
H1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	
H1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	
Other SMP sites within this SAC/NHA: Scanlan’s Island, Kinavarra West, Kileenaran, Tyrone House-Dunbeacon Bay, Kilcaimin, Oranmore North, Roscom West and North, Barna,	
Saltmarsh type: Bay	Substrate type: Mud

2 SITE DESCRIPTION

This site is located along the northern side of Galway Bay, 2 km west of Salthill. The saltmarsh is located in a small narrow inlet between Blake’s Hill (a steep sided hill) and Seaweed Point (a narrow pebble/cobble bar). It is one of 19 Saltmarsh Inventory sites listed in Galway Bay (Curtis & Sheehy-Skeffington 1998). This part of the Galway Bay shoreline is quite urbanised. A caravan park and camping site and a golf course is located adjacent to the east site in Knocknacarragh. Further east, the coast is built up at Salthill. West of the site, there is some improved grassland on Blake’s Hill. The land around the northern side of the saltmarsh is also urbanized. There are extensive loose cobble and pebble (LS1) and some exposed rock (LR2) along the shoreline in this area.

The site is located within the Galway Bay Complex candidate Special Area of Conservation (cSAC 208). Three Annex I habitats are present at this site, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). All these habitats are listed as qualifying interests for the Galway Bay Complex cSAC. Most of the saltmarsh habitats mapped at this site is located within the cSAC boundary. A small patch of MSM and some of the adjacent brackish or transitional CM2 habitats at the northern end of the saltmarsh are located outside the cSAC boundary. These were unintentional exclusions, as the 6 inch map was used to draw the cSAC site boundary. Sea Purslane (*Atriplex portulacoides*) is one species of local distinctiveness that is present at this site. This species is mainly distributed

along the eastern coast of Ireland and is only found in six 10 km² squares along the west coast.

The site is easily assessed from this park. There is a path along the coastline along the edge of the caravan park to the tip of Seaweed Point.

This area was also surveyed as part of the Galway City Habitat Inventory (Natura 2006).

3 SALTMARSH HABITATS

3.1 General description

The main part of the saltmarsh occurs at the head of the inlet. The saltmarsh is listed as a 'bay type' saltmarsh but it may have lagoon type influences. The basin at the head of the inlet was filled with water at the time of the survey and the outflow is quite narrow and was not flowing out significantly. The basin at the head of the inlet may contain a small permanent pool of water that only partially empties depending on the depth of the basin compared to the depth of the outflow.

Atlantic salt meadow habitat is situated around the seaward edge of the main section, with MSM developing further seaward. There is a definite boundary between the ASM and the MSM, identified by the presence of Sea Rush (*Juncus maritimus*). The MSM then transitions landward to brackish transitional vegetation (CM2) dominated by Sea Club-rush (*Bolboschoenus maritimus*). Common Reed (*Phragmites australis*) fringes the north-east side of the MSM. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. There is some freshwater influence acting on the site along some of the channels or drains that were dug across the marsh. Common Reed and other species occur along the landward end of some of these channels, particularly along the central channel that divides the saltmarsh. Some of the CM2 vegetation extends relatively far down the marsh into the MSM and ASM habitats.

A narrow band of ASM occurs along both sides of the inlet and there are further small fragments of saltmarsh further south near the near of the inlet on both sides, associated with the shingle/cobble banks. Further south along the inlet the ASM transitions landwards to a band of vegetation on a steeper slope dominated by Twitch (*Elytrigia repens*) and containing Radish (*Raphanus raphanistrum*), Spear-leaved Orache (*Atriplex prostrata*) and Sea Beet (*Beta maritima*). These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification.

The lower saltmarsh boundary is marked by a saltmarsh cliff and the ASM transitions to muddy and mixed intertidal sediment within the inlet. Near the neck of the inlet, the ASM patches transition to loose cobble and shingle.

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

EU Code	Habitat	Area (ha)
1310	<i>Salicornia</i> and other annuals colonizing mud and sand	0.003
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	1.416
1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	0.948
	Total	2.367

There are several small patches of *Salicornia* flats at this site. These are situated along the seaward edge of the ASM along the western side of the inlet. There are also several small patches located in pans in the ASM located on the eastern side of the inlet on the shingle/cobble bank.

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

Several small patches of this habitat occur in some of the pans within the ASM (Photo 5). These pans are only several metres in diameter and are filled with Glasswort (*Salicornia europaea* agg.) The pans also contain loose cobbles blown in from the adjacent cobble/shingle bar. These patches only cover about 5 m² in area.

The small patches that occur along the seaward edge of the ASM on the western side of the inlet occur on mixed sediment and pebble substrate.

3.3 Atlantic salt meadows (H1330)

The main body of ASM is located at the head of the inlet. There are also narrow bands of ASM extending from this area south along the sides of the inlet. Further south on the eastern side there are several breaks in the distribution of ASM along the cobble/shingle bar, where loose cobble is dominant. The ASM at the head of the inlet was used by roosting ducks.

The ASM at this site contains several typical saltmarsh communities. The lower zone along the saltmarsh cliff is dominated by rank ungrazed Common Saltmarsh-grass (*Puccinellia maritima*) with Sea Aster (*Aster tripolium*), Lax-flowered Sea Lavender (*Limonium humile*), Sea Plantain (*Plantago maritima*), Sea Pink (*Armeria maritima*) and Annual Sea-blite (*Suaeda maritima*) also present. The sward height is relatively high. There is some zonation evident at the head of the inlet but it is mainly dominated by lower saltmarsh zone vegetation. A second ASM community dominated by Red Fescue (*Festuca rubra*) is also present at this site, but is less extensive.

The narrow bands of saltmarsh that line both sides of the inlet display typical saltmarsh plant zonation (bands of Sea Aster are evident), although the development of communities is poor due to the narrow nature of the marsh. Sea Purslane (*Atriplex portulacoides*) occurs sporadically along both sides of the inlet. There are also several patches of Sea Rush occurring within the ASM.

Generally the saltmarsh topography is poorly developed and affected by the creation of drains across the marsh in the past. The ASM at the head of the inlet is generally quite flat and there are some small pans present. There is some natural creek formation in the ASM at the northern end. Further south, the patch of ASM that is located on the cobble/shingle bar contains small mounds and hollows that probably relate to the topography of the underlying stony material.

3.4 Mediterranean salt meadows (H1410)

This habitat is located at the northern end of the saltmarsh. The vegetation is quite dense and dominated by Sea Rush (50-75% cover). Other species present within this vegetation type include Red Fescue, Creeping Bent (*Agrostis stolonifera*), Autumn Hawkbit (*Leontodon autumnalis*), Saltmarsh Rush (*Juncus gerardii*), Sea Arrowgrass (*Triglochin maritimum*),

Common Scurvygrass (*Cochlearia officinalis*) and White Clover (*Trifolium repens*). Zonation in this habitat is shown by the presence of several species indicating terrestrial transition. These species include Common Sow-thistle (*Sonchus oleraceus*), Sea Mayweed (*Tripleurospermum maritimum*), Spear-leaved Orache, Birds-foot Trefoil (*Lotus corniculatus*), Curled Dock (*Rumex crispus*), Silverweed (*Potentilla anserina*) and Perennial Rye-grass (*Lolium perenne*). Twitch and Sea Club-rush occur in the upper parts of this habitat. Patches of CM2 transitional vegetation dominated by Sea Club-rush extend down into this habitat.

The vegetation is quite tussocky in places. There is little development of saltmarsh topography within this habitat.

4 IMPACTS AND ACTIVITIES

There are no significant impacts or activities affecting the site. The site is not grazed (140) and the vegetation is rank in places. This may also reflect some eutrophication of the inlet (701) via drains that enter the site, although there is no other evidence for this. There is a narrow track (501) along the eastern side of the saltmarsh that is used by walkers (622) to access the tip of Seaweed Point. The track on the saltmarsh is probably used by users of the adjacent campsite.

The saltmarsh has been modified in the past with several drains there were dug across the marsh. These channels were probably dug to help drains from adjacent land flow into the sea. There has also been some infilling in the past, although this infilling pre-dates the OSI 1995 series aerial photos. A patch of scrub and rough grassland occurs at the northern end of the site that has colonised on possible fill and has been excluded from the SAC. A second small area of amenity grassland occurs to the north-east of the site that has also probably been developed on marsh that was infilled in the past.

Erosion (900) at the site is not significant. A small island located in the inlet and marked on the OSI 2nd edition 6 inch map is still present at the site. A comparison of the OSI 2nd edition 6 inch map to the OSI 2000 series aerial photos shows that there have been no significant changes along the edge of the saltmarsh and no measurable erosion. The shingle/cobble bar along Seaweed Point has changed position in the past 100 years. This has affected the position (but not the extent) of some of the saltmarsh fragments that occur along the shingle/cobble bar, to the south of the main saltmarsh area.

There has been some construction along the western side of the inlet within the cSAC. The construction pre-dates the OSI 1995 series aerial photos. This construction includes some buildings that probably are related to water works or sewage treatment. Some rock armour has been developed along the lower shoreline adjacent to these buildings. Part of the shoreline may have been infilled to create the rock armour. This construction and associated impacts on this site are not assessed.

Impacts and activities adjacent to the site include urban land (401), Caravan and camping parks (608), golf course (601), grazing of livestock (140). These activities have little or no measurable impact on the saltmarsh habitat other than those already mentioned.

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

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1330	501	C	-1	0.05	Inside
1330	622	C	-1	0.05	Inside
1330	900	C	0	0.06	Inside

¹ EU codes as per Interpretation Manual.

² Description of activity codes are found in Appendix III, Summary Report 2007-2008.

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

⁴ Impact is rated as -2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence.

⁵ Location of activity: Inside = activities recorded within and directly impacting the saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

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

The overall conservation status of this site is assessed as *favourable* (Table 5.1). Seaweed Point is quite a small saltmarsh with few features of significant interest. There are no impacts or activities that are significantly affecting this site. No monitoring stops failed. A species of local distinctiveness (Sea Purslane) is present on the site. The main Annex I habitats transition to brackish habitats at the head of the inlet. However, there is little scope for further transition to drier habitats as the site is surrounded by built land. The site is protected from significant erosion by the pebble/cobble bar along Seaweed Point.

The site has been affected by infilling in the past. The infilling is likely to have mainly affected the brackish transitional habitats. The site has also been affected by drainage in the past. These impacts are not assessed, as they occurred outside the monitoring period.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are moderate. There is some brackish habitat at the head of the inlet to allow migration of saltmarsh habitats. The saltmarsh at this site is unlikely to significantly erode as it is protected by the pebble/cobble bar. However, these are very general predictions.

This site is located within the Galway Bay Complex cSAC. An old format NPWS management plan is available for the saltmarsh habitats at this cSAC but it is now out of date.

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

Habitat	EU Conservation Status Assessment			Overall EU conservation status assessment
	Favourable	Unfavourable - Inadequate	Unfavourable – Bad	
<i>Salicornia</i> flats (1310)	Extent Structure and functions Future prospects			Favourable
Atlantic salt meadows (1330)	Extent Structure and functions, Future prospects			Favourable
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 assessed as *favourable*. There is only a very small area of this habitat located at this site, although this is quite typical of these small sites. The presence of a semi-permanent pool in the basin of the inlet prevents the extensive development of this habitat. There are no indications of any loss of habitat due to erosion or to land-use changes.

5.2.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. No monitoring stops were carried out in this habitat due to the small extent present at the site. However, a visual assessment of the habitat indicated that it would probably pass for all attributes. Two ecotypes were present with Glasswort filling some of the small muddy pans on the saltmarsh and several patches also occurring adjacent to the seaward boundary of the ASM.

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 few impacts or activities affecting this habitat at this site, although a very small extent is present. This makes it vulnerable to small changes at the site.

5.3 Atlantic salt meadows (H1330)

5.3.1 Extent

The extent of this habitat is assessed as *favourable*. There are no indications of any loss of habitat due to erosion or to land-use changes within the current monitoring period. This habitat may have been reduced in extent due to construction on the site prior to the current monitoring period.

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 they all passed. All the attributes required for the structure and functions of this habitat reached their targets. Several typical ASM communities were recorded on this site and some zonation was evident, although the main part of the habitat is dominated by one community (the lower zone). There is no pioneer zone present at this site and much of the lower ASM boundary is marked by a saltmarsh cliff. The saltmarsh topography was poorly developed but this is typical on a site of this small nature.

Sea Purslane (*Atriplex portulacoides*) is also present at this site and was recorded at two locations. This is another species of local distinctiveness. This species is mainly distributed along the eastern coast of Ireland and is only found in six 10 km² squares along the west coast (Preston *et al.* 2002). Curtis and Sheehy-Skeffington (1998) have discussed the distribution of this species and hypothesised that its lack of abundance on the west coast compared to the east coast is related to the higher levels of grazing on west coast saltmarshes. The lack of grazing on some of the saltmarshes in Galway Bay may be one of its reasons for its presence on saltmarshes in Galway Bay.

The Atlantic salt meadows form part of a larger coastal ecosystem. There are natural transitions to other habitats at both the upper and lower saltmarsh boundaries. Mixed sediment, shingle and pebble deposits are frequently found in the intertidal area and the ASM transitions to these habitats. The upper landward boundary of the ASM also varies with transition to MSM in the main section at the head of the inlet and transition to CM2 vegetation along the narrow bands of ASM that occur along the edges of the inlet.

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 are few impacts or activities affecting this site. There are little prospects for the loss of habitat due to erosion in the future. The site is within a cSAC so the habitat should not be affected by land-use changes.

5.4 Mediterranean salt meadows (H1410)

5.4.1 Extent

The extent of this habitat is assessed as *favourable*. There are no indications of any loss of habitat due to erosion or to land-use changes within the current monitoring period. This habitat may have been reduced in extent by infilling at the north of the site prior to the current monitoring period.

5.4.2 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 they all passed. All the attributes required for the structure and functions of this habitat reached their targets. The species composition of this habitat was typical of this habitat. Sea Rush was generally quite dense. Some zonation was noted in the habitat and this was noted from other saltmarsh species, particularly species indicating terrestrial transition. The position and vegetation composition of this habitat indicates that much of the habitat is somewhat higher, or less affected by tidal inundation compared to other sites (appearance of species such as Birdsfoot and Perennial Rye-grass). The topography was poorly developed, but this is typical of a small patch of 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. There are few impacts or activities affecting this site. There are little prospects for the loss of habitat due to erosion in the future. The site is within a cSAC so the habitat should not be affected by land-use changes.

6 MANAGEMENT RECOMMENDATIONS

There are no specific management recommendations for the Annex I saltmarsh habitats present at this site.

7 REFERENCES

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

Natura (2006). *Galway City habitat inventory*. A report for Galway City Development Board. Galway County Council.

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

8 APPENDIX I

Table 8.1. Areas of SMP habitats mapped using GIS.

SMP Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 <i>Salicornia</i> flats	0.003	0.003				
2	Spartina swards						
3	1330 Atlantic salt meadow	1.416		1.416			
4	1410 Mediterranean salt meadow	0.948			0.948		
5	ASM/MSM mosaic (50/50)						
6	ASM/ <i>Spartina</i> mosaic						
7	1330/other SM (CM2) mosaic						
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	0.663					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)						
11	Isolated <i>Spartina</i> clumps on mud (5%)						
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic						
14	<i>Spartina</i> sward dominated, with some ASM						
15	1310/ <i>Spartina</i> mosaic						
16	ASM dominated with some <i>Spartina</i>						
17	1330/sand dune mosaic						
18	Other SM (CM2)	1.291					
19	1330/rocky shore mosaic						
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	4.321	0.003	1.416	0.948		



	Saltmarsh Monitoring Project 2007-2008	Seaweed Point	SMP code: SMP0095	0 40 80 120 160 200 Meters	
		Galway Bay Complex SAC (000268)	<small>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 3953)</small>	Date of production: 22/02/2009 Map version: 1	

Appendix V – Roscam West and South site report and habitat map from the Saltmarsh Monitoring Project (McCorry & Ryle 2009)

1 SITE DETAILS

SMP site name: Roscam West and South	SMP site code: SMP0094
Dates of site visit 10/10/2007	CMP site code: N/A
SM inventory site name: Roscam West and South	SM inventory site code: 118
NPWS Site Name: Galway Bay Complex	
NPWS designation cSAC: 000208	MPSU Plan: old format plan available
pNHA: 000208	SPA: 004031
County: Galway	Discovery Map: 46 Grid Ref: 133700, 224800
Aerial photos (2000 series): O 3409-A,C	6 inch Map No: Ga094
Annex I habitats currently listed as qualifying interests for Galway Bay Complex cSAC:	
H1310 Salicornia and other annuals colonizing mud and sand	
H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	
H1410 Mediterranean salt meadows (Juncetalia maritimi)	
Other SMP sites within this SAC/NHA: Scanlan’s Island, Kinavarra West, Kileenaran, Tyrone House-Dunbeacon Bay, Kilcaimin, Oranmore North, Seaweed Point, Barna,	
Saltmarsh type: Bay	Substrate type: Mud/Sand

2 SITE DESCRIPTION

Roscam West and South saltmarsh is located along the north-east part of the Galway Bay shoreline and 1km east of Galway City. The site is located along the west side of a small peninsula containing Roscam Townland. It is one of 19 Saltmarsh Inventory sites listed in Galway Bay (Curtis & Sheehy-Skeffington 1998). There was a mix up on the Saltmarsh Inventory with an adjacent site Roscam East (117). The sites on the inventory are labelled in an anti-clockwise direction around Ireland, so Roscam West and South should have been listed as 117. The grid references on the saltmarsh inventory for these sites have also been mixed up.

This part of Galway Bay is still quite rural, although there are frequent single dwellings along the minor roads that access this area. Land at Roscam is farmed with grazing livestock prevalent. The Galway-Dublin railway is located to the north of the site, about 100 m from the north end of the saltmarsh. Scrub has developed in unmanaged areas between the railway and the shoreline. The intertidal zone contains several habitats with mudflats and mixed sediment with exposed rock and loose cobble prevalent. The shoreline is somewhat sheltered and parts are lined with very large boulders.

The site is located within the Galway Bay Complex candidate Special Area of Conservation (cSAC 208). Two Annex I habitats are present at this site, *Salicornia* flats and Atlantic salt meadows (ASM). Both these habitats are listed as qualifying interests for the adjacent

Galway Bay Complex cSAC. All of the saltmarsh habitats mapped at this site is located within the cSAC boundary. Sea Wormwood (*Seriphidium maritimum*) is one species of local distinctiveness that is present at this site.

The shoreline was accessed by parking on minor roads near the shoreline and accessing the shoreline at the end of a cul-de-sac. The land is owned by a local farm situated to the east of the site.

This area was also surveyed as part of the Galway City Habitat Inventory (Natura 2006).

3 SALTMARSH HABITATS

3.1 General description

The saltmarsh at this site is dominated by ASM. It is mainly situated at the north and southern ends of a small circular-shaped bay at the north-west corner of the peninsula. The main saltmarsh segments are separated by a dense large boulder field along the shoreline of the inner part of this small bay. The boulder field was probably created by land improvement in adjacent fields for the construction of several houses. The saltmarsh at the southern end of the bay has mainly developed in a sheltered area at the landward side of a vegetated stony bank.

This saltmarsh transitions to dry coastal grassland on the stony bank and on the adjacent fields. There is a subtle change from ASM to coastal grassland that is indicated by the presence of Yarrow (*Achillea millefolium*) Birdsfoot (*Lotus corniculatus*), Silverweed (*Potentilla anserina*), although it may still be dominated by Red Fescue (*Festuca rubra*) or Creeping Bentgrass (*Agrostis stolonifera*). Sea Beet (*Beta maritima*) and Sea Mayweed (*Tripleurospermum maritimum*) are both present where the upper saltmarsh boundary is disturbed, like along the track. The upper section of saltmarsh transitions at its upper boundary to scrub, to small patches of coastal grassland or to patches of vegetation dominated by Twitch (*Elytrigia repens*). These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. This zone also contains Sea Beet, Common Scurvygrass (*Cochlearia officinalis*), Spear-leaved Orache (*Atriplex prostrata*) and Frosted Orache (*Atriplex lacinata*).

This saltmarsh is drained by one main channel that develops into a wide shallow pool/lagoon further south that contains scattered cobbles. Part of the pool is dry and exposed mud is present. Part of this channel contains large boulders that may have been placed there during adjacent land improvement. The ASM transitions at its lower boundary to mud and sandflats, mixed sediment and loose cobble. There is a saltmarsh cliff around the lower ASM boundary within the small bay. Some sections have scattered cobbles along the seaward edge of the ASM before transition to mudflats.

Patches of ASM have also developed along the seaward side of the stony ridge further south along the shoreline of the peninsula. Patches of ASM occur around the coastline towards Roscam East and Lough Atalia, adjacent saltmarsh inventory sites. Saltmarsh is also found on most of the small islands that are situated close to the shoreline in this part of Galway Bay.

There is a small patch of *Salicornia* flats that has developed in part of the large bare mud hollow that has developed on the landward side of the stony ridge. There is a natural transition up slope from mudflats dominated by Glasswort, to pioneer ASM and then to mid marsh ASM.

Table 3.1. Area of saltmarsh habitats mapped at Roscam West and South.

EU Code	Habitat	Area (ha)
1310	<i>Salicornia</i> and other annuals colonizing mud and sand	0.023
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	3.302
	Total*	3.335

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

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

This habitat is located in the small hollow or lagoon containing bare mud. A dense patch is present dominated by Glasswort (*Salicornia europaea* agg.) with some Greater Sea Spurrey (*Spergularia media*). Some Common saltmarsh-grass (*Puccinellia maritima*) is present in the upper part of this habitat. The Glasswort has vegetated bare mud and is only situated at the shallow end of the hollow/lagoon.

Scattered Glasswort also occurs as a small band along the creek on peaty mud. Sea Spurrey is also present in this pioneer band of saltmarsh vegetation. There is some minor poaching in this zone.

3.3 Atlantic salt meadows (H1330)

Zonation in the ASM is clearly evident. There are several typical ASM saltmarsh communities present. The lower zone is dominated by Common Saltmarsh-grass with Sea Aster (*Aster tripolium*) and Glasswort. Other species present include Lax-flowered Sea Lavender (*Limonium humile*) and Sea Milkwort (*Glaux maritima*). This zone is found along the edges of the main creek or channel that drains the main area of ASM and is also found along the seaward edge of the northern section of saltmarsh. A pioneer zone is present between the ASM and 1310 in the small hollow/lagoon present to the landward side of the stony bank. The northern section of saltmarsh also has a small area in the sheltered north-west corner of the small bay that is accreting and there is an accretion ridge onto sandflats. This pioneer zone contains Common Saltmarsh-grass, Glasswort, Sea Aster and rare Lax-flowered Sea Lavender.

The mid-marsh zone is more prevalent and is indicated by the appearance of frequent Sea Plantain (*Plantago maritima*) and Red Fescue (*Festuca rubra*). There is some minor development of a typical low *Plantago-Armeria* sward but otherwise, this zone is dominated by Red Fescue. Other species present include Lax-flowered Sea-lavender (*Limonium humile*), Sea Pink (*Armeria maritima*), Sea Arrowgrass (*Triglochin maritimum*), Common Scurvygrass and Autumn Hawkbit (*Leontodon autumnalis*). A second mid-upper community with more frequent Saltmarsh Rush (*Juncus gerardii*) is also present.

The upper saltmarsh zone is dominated by Red Fescue and Creeping Bent-grass. Other species present include Autumn Hawkbit Sea Milkwort, Spear-leaved Orache, Curled Duck (*Rumex crispus*), Buck's-horn Plantain (*Plantago coronopus*), and Frosted Orache. This zone transitions to dry coastal grassland. Sea Wormwood was found at one location in the northern section of this site in the upper saltmarsh zone.

The saltmarsh follows the natural shoreline topography and the glacial deposits that underlie this area. The mounds and slopes on the saltmarsh and transitions to coastal grassland reflect these deposits. There are occasional pans within the ASM in some of the flatter mid-upper sections. The saltmarsh topography with creeks and pans is moderately well-developed. The lower saltmarsh boundary around the bay is indicated by a low saltmarsh cliff (0.3-0.5 m high) with some old erosion features. Mud mounds are present but there is no indication of any significant erosion at this site. The substrate on the site is mainly muddy, but is somewhat peaty along the upper saltmarsh boundary in the northern section.

The fragments of ASM further south along the seaward edge of the peninsula contain more frequent exposed rock, loose cobble and loose boulders. Some of these patches could be considered exposed rock/ASM mosaic. These patches have developed on thinner bands of muddy sediment and have frequent eroded patches with exposed cobbles. There is no saltmarsh cliff present along the edges of these patches, which transition to loose cobbles and exposed rock.

The southern section is grazed by cattle but the grazing intensity is low with some minor poaching. The sward height varies between 5-10 cm high in the mid-upper zones. Horses are also present on the site but a single strand fence keeps them from straying onto the saltmarsh and the shoreline. The northern section is also grazed lightly and there is some light poaching by cattle or horses in this area. The loose rocks cobbles and exposed rock are occasionally scattered over the ASM that is sheltered by the stony bank.

4 IMPACTS AND ACTIVITIES

Several impacts and activities affect this site, but generally have low or neutral intensities (Table 4.1). The site is grazed by cattle (140) but the grazing intensity was low and overall there is only minor poaching. Some negligible areas had moderate-high levels of poaching. An old track or green lane (501) accesses the shoreline and may be an old right of way for seaweed collection. The track mainly crosses over the coastal grassland along the upper SM boundary and along the upper ASM transition. Some local people use the track for walking (622) but the intensity is also low. There was a collection of large boulders (Info Point 2) placed in the narrow channel that drains the main section of saltmarsh. These limestone boulders may have been placed here after adjacent land improvement (103). It is not known if this work occurred within the current monitoring period. The Galway City Habitat Inventory (Natura 2006) also noted some dumping in and around the saltmarsh at Roscam (421).

Erosion (900) at the site is not significant. Some of the saltmarsh patches further south on the more exposed seaward edge of the peninsula do show signs of erosion but these signs are typical for saltmarsh in this type of more exposed location. A comparison of the OSI 2nd edition 6 inch map to the OSI 2000 series aerial photos shows that there have been no significant changes along the edge of the saltmarsh and no measurable erosion in the past 100 years. An accretion ridge was noted along the edge of the northern section and a comparison of the OSI 2nd edition 6 inch map to the OSI 2000 series aerial photos shows there has been some saltmarsh growth in this area in the past 100 years. Accretion is still continuing but there has been no measurable growth of saltmarsh in the current monitoring period. Erosion is assessed as having a neutral impact.

Impacts and activities adjacent to the site include dispersed habitation (403), and fertilization (120) and the grazing of livestock (140) related to farming practises.

The site is likely to have been affected somewhat by the clearance of rocks and boulders from adjacent land at the north-west corner of the peninsula and the placing of these boulders on the shoreline (103). It is likely that a narrow band of saltmarsh occurred around this shoreline prior to the placing of these boulders in this zone. The boulders also act as coastal defence and protect the area containing several houses. This activity is likely to have occurred prior to the current monitoring period. Farmland adjacent to the saltmarsh has been improved in the past (103) with coastal grassland and exposed rock transformed into improved grassland.

Table 4.1. Intensity of various activities on saltmarsh habitats at Roscam West and South.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1310	140	C	0	0.023	Inside
1330	103	B	-1	0.1	Inside
1330	140	B	0	3.301	Inside
1330	143	C	-1	0.001	Inside
1330	421	C	-1	3.302	Inside
1330	501	C	0	0.01	Inside
1330	622	C	0	3.302	Inside
1330	900	C	0	0.15	Inside
1330	910	C	+1	0.05	Inside

¹ EU codes as per Interpretation Manual.

² Description of activity codes are found in Appendix III, Summary Report 2007-2008.

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

⁴ Impact is rated as -2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence.

⁵ Location of activity: Inside = activities recorded within and directly impacting the saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

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

The overall conservation status of this site is *favourable* (Table 5.1). There are no impacts or activities that are significantly affecting this site. Roscam West and South is a relatively small saltmarsh but with several features of interest such as natural transitions to other coastal habitats and to dry coastal grassland in terrestrial areas. A species of local distinctiveness (Sea Wormwood) is present on the site. No monitoring stops failed. The largest section of saltmarsh is protected from erosion by the stony bank along the outer edge of the saltmarsh. Some of the adjacent farmland has been improved in the past, with rocks removed and improved grassland developed.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are good. The saltmarsh at this site is mainly distributed according to the underlying glacial deposits and there is some scope for landward transition of saltmarsh

vegetation up slope into coastal grassland vegetation. However, these are very general predictions.

This site is located within the Galway Bay Complex cSAC. An old format NPWS management plan is available for the saltmarsh habitats at this cSAC but it is now out of date.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Roscam West and South.

Habitat	EU Conservation Status Assessment			Overall EU conservation status assessment
	Favourable	Unfavourable – Inadequate	Unfavourable – Bad	
<i>Salicornia</i> flats (1310)	Extent Structure and functions Future prospects			Favourable
Atlantic salt meadows (1330)	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 assessed as *favourable*. This habitat is distributed in the interior of the saltmarsh along the edge of a small pool/lagoon and the channel that drains this area. There are no indications of any loss of habitat due to erosion or to land-use changes. There are no indications that this habitat occurred on mudflats or sandflats in the small bay at the north-west corner of the peninsula.

5.2.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. One monitoring stop was carried out in this habitat and it passed. All the attributes required for the structure and functions of this habitat reached their targets. There was a natural transition along a moderate slope from adjacent ASM to 1310 *Salicornia* flats. The habitat may be affected by temporary changes in the water level within the lagoon. This habitat is also found along the edges of some of the creeks and the main channel that drains the saltmarsh.

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 few impacts or activities affecting this habitat at this site, although a very small extent is present. This makes it vulnerable to small changes at the site.

5.3 Atlantic salt meadows (H1330)

5.3.1 Extent

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

The area of Annex I ASM habitat may have decreased slightly by the placing of boulders along a section of shoreline that was likely to have contained a narrow band of saltmarsh but this loss may be compensated somewhat by accretion in the past 100 years. These impacts are not assessed as they occurred outside the current monitoring period.

5.3.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. Nine monitoring stops were carried out in this habitat and they all passed. All the attributes required for the structure and functions of this habitat reached their targets. Several typical ASM communities were recorded on this site and zonation was evident with upper mid and lower zone saltmarsh communities. In addition some pioneer saltmarsh vegetation is present at this site. The saltmarsh topography is moderately well-developed. There are natural transitions to other coastal habitats at both the lower and upper saltmarsh boundaries. The Atlantic salt meadows form part of a larger coastal ecosystem.

A species of local significance, Sea Wormwood, which is found frequently on saltmarshes around Galway Bay, is present at this site. This species has a scattered distribution in Ireland and is only found recently in eight 10 km² squares around the coast of Ireland (Preston *et al.* 2002). Webb *et al.* (1996) described its distribution as rare and very local although it is not recorded as a rare species in The Red Data Book (Curtis & McGough 1988).

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 are few impacts or activities affecting this site. There are little prospects for the loss of habitat due to erosion in the future. The site is within a cSAC so the habitat should not be affected by land-use changes.

6 MANAGEMENT RECOMMENDATIONS

There are no specific management recommendations for the Annex I habitats at this site.

7 REFERENCES

Curtis, T.G.F. & McGough, H.N. (1988). *The Irish Red Data Book*. Stationary Office, Dublin.

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

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8 APPENDIX I

Table 8.1. Areas of SMP habitats mapped using GIS.

SMP Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 <i>Salicornia</i> flats	0.023	0.023				
2	Spartina swards						
3	1330 Atlantic salt meadow	3.302		3.302			
4	1410 Mediterranean salt meadow						
5	ASM/MSM mosaic (50/50)						
6	ASM/ <i>Spartina</i> mosaic						
7	1330/other SM (CM2) mosaic						
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	3.691					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)						
11	Isolated <i>Spartina</i> clumps on mud (5%)						
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic						
14	<i>Spartina</i> sward dominated, with some ASM						
15	1310/ <i>Spartina</i> mosaic						
16	ASM dominated with some <i>Spartina</i>						
17	1330/sand dune mosaic						
18	Other SM (CM2)						
19	1330/rocky shore mosaic						
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	7.016	0.023	3.302			



	Saltmarsh Monitoring Project 2007-2008	Roscom West and North	SMP code: SMP00S4	0 60 120 180 240 300 Meters	
		Galway Bay Complex SAC (000268)	<small>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: 9953).</small>	Date of production: 20/02/2009 Map version: 1	

Appendix VI – Oranmore North site report and habitat map from the Saltmarsh Monitoring Project (McCorry & Ryle, 2009)

1 SITE DETAILS

SMP site name: Oranmore North	SMP site code: SMP0093
Dates of site visit 10/10/2007	CMP site code: N/A
SM inventory site name: Oranmore North	SM inventory site code: 119
NPWS Site Name: Galway Bay Complex	
NPWS designation cSAC: 000208	MPSU Plan: old format plan available
pNHA: 000208	SPA: 004031
County: Galway	Discovery Map: 46 Grid Ref: 137500, 224900
Aerial photos (2000 series): O 3410-A,B,C	6 inch Map No: Ga095
Annex I habitats currently listed as qualifying interests for Galway Bay Complex cSAC:	
H1310 Salicornia and other annuals colonizing mud and sand	
H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	
H1410 Mediterranean salt meadows (Juncetalia maritimi)	
Other SMP sites within this SAC/NHA: Scanlan’s Island, Kinavarra West, Kileenaran, Tyrone House-Dunbeacon Bay, Kilcaimin, Roscom West & South, Seaweed Point, Barna,	
Saltmarsh type: Bay	Substrate type: Mud/Sand

2 SITE DESCRIPTION

Oranmore North saltmarsh is located along the north-east shoreline of Galway bay in Co. Galway. It is located to the north-west of Oranmore Village and extends along the shoreline adjacent to R339 Galway-Oranmore Road. The survey site extends from Cartron Townland to Innplot (Oranmore) and is not a definitive area. Saltmarsh frequently appears in sheltered sections of this part of the Galway Bay shoreline and is distributed to the west (Roscam East) and the south (Oranmore-Rocklands) of the survey site. The intertidal area is dominated by exposed rock and mixed sediment with abundant brown algae cover.

The shoreline along the western side of the survey site is still quite rural and the dominant habitat is improved grassland used by grazing livestock. There has been some ribbon development along the R339 and recent construction has affected saltmarsh in this area. Road improvements along the R339 have also affected the saltmarsh in the past. The shoreline becomes increasingly more modified further east and there has been significant modification where the Millplot stream reaches the tidal influence at a road bridge crossing into Oranmore. Much of this modification is related to construction of improved water works in the area.

The site is located within the Galway Bay Complex candidate Special Area of Conservation (cSAC 208). One Annex I habitat is present at this site Atlantic salt meadows (ASM). This habitat is listed as a qualifying interest for the Galway Bay Complex cSAC. Most of the saltmarsh mapped at this site is located within the cSAC boundary. There are several fragments of Annex I habitats located outside the boundary around the site. Some are unintentional exclusions, as the 6 inch map was used to draw the SAC site boundary and there are some errors between this map and the actual ground as indicated from the aerial photos. One relatively large area of ASM that occurs on the north side of the R339 road has also been excluded.

This site was accessed by crossing adjacent farmland to access the shoreline. The shoreline was followed east to Oranmore. The area south of the road bridge was accessed via a narrow lane.

3 SALTMARSH HABITATS

3.1 General description

The only Annex I habitat recorded at this site was Atlantic salt meadows (Table 3.1). A ribbon of ASM was distributed along the shoreline. The ribbon of habitat widened in places to form some larger areas of habitat. Some ASM was located along the north side of the R339 road and is flooded by a culvert under the road. The ASM generally transitioned to upper saltmarsh (CM2) and transitional grassland vegetation dominated by Twitch (*Elytrigia repens*) and containing Sea Mayweed (*Tripleurospermum maritimum*) and Spear-leaved Orache (*Atriplex prostrata*) along the shoreline. The area of saltmarsh located north of the road transitioned to semi-improved grassland that is grazed by livestock. This area was not surveyed due to the presence of livestock.

A more unusual saltmarsh-terrestrial grassland transitional community has developed at one location on the site. This vegetation community is located in a relatively flat area and was dominated by Creeping Bentgrass with Red Fescue and also contained a lot of transitional species such as Curled Dock (*Rumex crispus*), Broad-leaved Dock (*Plantago major*), Autumn Hawkbit (*Leontodon autumnalis*) and Spear-leaved Orache (*Atriplex prostrata*). There is obviously some brackish influence in this area but it could not be classified as ASM (Glauco-Puccinellietalia maritimae). The upper saltmarsh boundary is difficult to pin-point in this area. One unusual feature is that Broad-leaved Plantain extends seawards into the upper saltmarsh in places.

A second transitional community is located adjacent to the road bridge and contains frequent Sea Club-rush (*Bolboschoenus maritimus*). These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. The saltmarsh transitions to mixed sediment, exposed rock and abundant brown algae cover at its lower boundary.

Table 3.1. Area of saltmarsh habitats mapped at Oranmore North.

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	4.838
	Total	4.838

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

3.2 Atlantic salt meadows (H1330)

The western side of the site contains a narrow band of saltmarsh vegetation up to 20 m wide. The saltmarsh zone is disturbed in places by rocks and cobbles scattered over the marsh. Some sections have been infilled. There are piles of cobbles and rocks scattered along the lower saltmarsh boundary, presumably to reduce coastal erosion. There is a low saltmarsh cliff (< 0.3 m high) along this section. The topography is therefore damaged, although some small pans are evident.

Zonation of the saltmarsh vegetation is still also evident although it is also disturbed in places. Several typical Atlantic salt meadow communities are present. Species such as Common Saltmarsh-grass, Sea Pink, Saltmarsh Rush and Sea Milkwort are present growing amongst the rocks and cobbles. Other species

present include Spear-leaved Orache, Sea Plantain and Buck's-horn Plantain (*Plantago coronopus*). An upper saltmarsh community is present and contains Red Fescue, Creeping Bentgrass, Curled Dock, Autumn Hawkbit, Scurvygrass (*Cochlearia officinalis*), Twitch and Sea Spurrey sp.

Further east the saltmarsh is less disturbed. Typical lower marsh communities dominated by Common Saltmarsh-grass and smaller amounts of Sea Plantain are present. This community also contains Sea Aster (*Aster tripolium*). The mid and upper saltmarsh zones are generally dominated by Red Fescue with smaller amounts of Creeping Bentgrass and Saltmarsh Rush.

The saltmarsh topography is poorly developed at this site as there are few significant flat areas present. Most of the saltmarsh is present as a relatively narrow coastal strip. Some of the natural saltmarsh topography has been disturbed by the infilling and seawall development. The best section of saltmarsh topography is located to the road of the road. This area contains typical saltmarsh creeks and pans. There is a low saltmarsh cliff along the lower saltmarsh boundary with minor signs of erosion along the lower boundary in places.

4 IMPACTS AND ACTIVITIES

This site has been quite disturbed by a range of impacts and activities during the current monitoring period (Table 4.1). The site spans several different land-holdings and some parts are not grazed, some parts are grazed lightly (140), while other sections have been damaged by poaching and overgrazing (143).

Saltmarsh along the western part of the site has been damaged by coastal defence works to protect farmland (871). A new seawall about 1 m high has been constructed with large rocks along the seaward boundary and there has been some infilling behind the seawall. Further east, looser rocky material has been deposited along the lower saltmarsh boundary. Some of this material is also scattered over the saltmarsh, giving the appearance of a rocky/ASM mosaic. Further east, there has been some infilling within the monitoring period along the shoreline and saltmarsh related to road improvement works along the R339 (802). Some of these modifications to the shoreline are irreparable (infilling).

A second location midway along the site has also been affected by infilling (801) and by the construction of a seawall (871). Building work was being carried out on the site at the time of the survey. Construction has also been carried out at the eastern side of the site. A new pump house and pipeline was built on the shoreline and on saltmarsh. The path of the pipeline follows part of the saltmarsh ribbon. The pump-house area was infilled. This has resulted in some loss of habitats (801). The pipeline path was excavated and then refilled (512). Some of this damage is irreparable.

Erosion (900) at the site is not significant. The lower saltmarsh boundary has a low saltmarsh cliff with some erosional features at some locations along the site, with small isolated hags or mud balls appearing. A comparison of the OSI 2nd edition 6 inch map to the OSI 2000 series aerial photos shows that there have been no significant changes along the edge of the saltmarsh. A comparison of the 1995 and 2000 OSI aerial photos also indicates that there was no measurable erosion during this part of the monitoring period. Erosion is assessed as having a neutral impact on a small portion of the saltmarsh face.

Impacts and activities adjacent to the site include urbanization (401), dispersed urbanisation (403), roads (502) and grazing of livestock (140). These activities have little or no measurable impact on the saltmarsh habitats.

Table 4.1. Intensity of various activities on saltmarsh habitats at Oranmore North.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1330	140	C	0	3.838	Inside
1330	143	B	-1	1.00	Inside
1330	512	A	-1	0.478	Inside
1330	801	C	-1	0.1	Inside
1330	801	A	-2	0.15	Inside
1330	802	A	-2	0.1	Inside
1330	871	A	-1	0.250	Inside
1330	871	C	-1	0.1	Inside

¹ EU codes as per Interpretation Manual.

² Description of activity codes are found in Appendix III, Summary Report 2007-2008.

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

⁴ Impact is rated as -2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence.

⁵ Location of activity: Inside = activities recorded within and directly impacting the saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

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

The overall conservation status of Oranmore North saltmarsh is *unfavourable-bad* (Table 5.1). There are several impacts and activities that have affected separate sections of this site at different times during the current monitoring period that have caused irreversible damage. There are several sections that have been infilled and have been built on, or are being used for construction. A significant section of the saltmarsh has also been affected by coastal defence works and the excavation of a pipe-line. The saltmarsh is still intact in these areas, but has been significantly disturbed. Two monitoring stops out of a total of nine failed at this site.

Oranmore North is a relatively small site that is part of the Galway Bay suite of sites. It is probably one of the most disturbed sites in Galway Bay and this is related to development in this area. It has few features of specific interest and the saltmarsh communities and topography are typical of the area. The presence of one unusual grassland community with elements of upper saltmarsh and dry terrestrial grassland is notable. No species of local distinctiveness were noted on the site.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are poor-moderate. The saltmarsh is distributed along an irregular shoreline with some low-lying areas where there may be some migration and some sections that are enclosed by seawalls or grassy banks. . However, these are very general predictions.

This site is located within the Galway Bay Complex cSAC. An old format NPWS management plan is available for the saltmarsh habitats at this cSAC but it is now out of date.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Oranmore North.

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

5.2 Atlantic salt meadows (H1330)

5.2.1 Extent

The extent of this habitat is assessed as *unfavourable-inadequate*. There are several indications of minor losses of habitat due to infilling and coastal defence within the current monitoring period (about 0.3 ha). There are frequent signs of erosion along the saltmarsh at this site but this is assessed as being typical of a site of this type. There have been no significant changes in the extent of saltmarsh habitat in the past 100 years due to erosion, when the OSI 2nd edition 6 inch map is compared to recent aerial photos.

5.2.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-bad*. Nine monitoring stops were carried out in this habitat and two failed. Most of the attributes required for the structure and functions of this habitat reached their targets. The main reason for the failed stops was damage from overgrazing and poaching. In addition, other sections of saltmarsh have been damaged by coastal protection works and by the excavation of a pipeline. Several typical ASM communities were recorded on this site and zonation was evident with upper mid and lower zone saltmarsh communities, but zonation in some sections was affected by the disturbance. The saltmarsh topography is poorly developed. There are natural transitions to other coastal habitats at both the lower and upper saltmarsh boundaries. The Atlantic salt meadows form part of a larger coastal ecosystem.

5.2.3 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. This site is affected by overgrazing in some sections. The extent and structure and functions have been affected by infilling, coastal protection works and excavation works in the current monitoring period. These impacts and activities should be minimized in the future as most of the saltmarsh habitat is located within the cSAC and these impacts and activities should be licensed and controlled by the local authorities for the benefit of nature conservation.

The habitat extent is not likely to be significantly reduced in the near future, although there are some signs of erosion.

6 MANAGEMENT RECOMMENDATIONS

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

7 REFERENCES

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

8 APPENDIX I


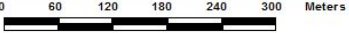

Table 8.1. Areas of SMP habitats mapped using GIS.

SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 <i>Salicornia</i> flats						
2	Spartina swards						
3	1330 Atlantic salt meadow	4.473		4.473			
4	1410 Mediterranean salt meadow						
5	ASM/MSM mosaic (50/50)						
6	ASM/ <i>Spartina</i> mosaic						
7	1330/other SM (CM2) mosaic	0.634		0.317			
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	5.866					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)						
11	Isolated <i>Spartina</i> clumps on mud (5%)						
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic						
14	<i>Spartina</i> sward dominated, with some ASM						
15	1310/ <i>Spartina</i> mosaic						
16	ASM dominated with some <i>Spartina</i>						
17	1330/sand dune mosaic						
18	Other SM (CM2)	0.997					
19	1330/rocky shore mosaic	0.096		0.048			
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	12.066		4.838			



Legend

- SAC Boundary
- 1330 Atlantic salt meadows
- 1330/other SM (CM2) mosaic
- 1330/rocky shore mosaic
- Other Saltmarsh (CM2)
- other
- 1330 monitoring stops

 Comhaltas, Oidhreachtaí agus Idirleas Áine Environmental, Heritage and Local Government National Parks and Wildlife Service	Saltmarsh Monitoring Project 2007-2008	Oranmore North Galway Bay Complex SAC (000268)	SMP code: SMP0093		N 
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: 5963).			Date of production: 20/02/2009 Map version: 1	Original Drawing Size: 297 x 420 (A3) Scale: 1:4750	

Appendix VII – Kilcaimin site report and habitat map from the Saltmarsh Monitoring Project (McCorry & Ryle, 2009)

1 SITE DETAILS

SMP site name: Kilcaimin	SMP site code: SMP0092
Dates of site visit 11/10/2007	CMP site code: N/A
SM inventory site name: Kilcaimin	SM inventory site code: 121
NPWS Site Name: Galway Bay Complex	
NPWS designation cSAC: 000208 pNHA: 000208	MPSU Plan: old format plan available SPA: 004031
County: Galway	Discovery Map: 46 Grid Ref: 136250, 221100
Aerial photos (2000 series): O 3470-B,D; O 3471-C	6 inch Map No: Ga094, Ga095
Annex I habitats currently listed as qualifying interests for Galway Bay Complex cSAC:	
H1310 Salicornia and other annuals colonizing mud and sand	
H1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	
H1410 Mediterranean salt meadows (Juncetalia maritimi)	
Other SMP sites within this SAC/NHA: Scanlan's Island, Kinavarra West, Kileenaran, Tyrone House-Dunbeacon Bay, Oranmore North, Roscom West & South, Seaweed Point, Barna,	
Saltmarsh type: Bay	Substrate type: Mud

2 SITE DESCRIPTION

Kilcaimin saltmarsh is located at the east side of Galway Bay in Co. Galway. This saltmarsh site is one of the several saltmarshes that have developed in the long narrow inlets found on this part of Galway Bay. It is one of 19 Saltmarsh Inventory sites listed in Galway Bay (Curtis & Sheehy-Skeffington 1998). Kilcaimin saltmarsh is located in the upper part of Mweeloon Bay in the north-east section of Galway Bay and is about 4.5 km west of Clarinbridge. There are several small islands present in this narrow inlet. This part of Co. Galway is quite rural although there is some ribbon development in places along minor roads in the area and frequent dispersed habitation. The area is relatively low-lying and dominated by agricultural grassland.

Saltmarsh is dispersed along both the northern and southern shorelines of this inlet. The largest section of habitat is located at the head of the inlet, but there are several other smaller patches of habitat present at various sheltered sites around the inlet. There is a narrow ribbon of habitat of various widths (2-25 m) along most of the shoreline. Saltmarsh habitat is also found around some of the small islands found in the inlet. The inlet mainly contains mixed sediment in the intertidal zone seaward of the saltmarsh. At one location there are several tree stumps visible in the intertidal area along the shoreline.

The site is located within the Galway Bay Complex candidate Special Area of Conservation (cSAC 208). Three Annex I habitats are present at this site, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). All these habitats are listed as qualifying interests for the Galway Bay Complex cSAC. Sea Purslane (*Atriplex portulacoides*) is one species of local distinctiveness that is present at this site. Most of the saltmarsh habitats mapped at this site are located within the cSAC boundary. There are several fragments of Annex I habitats located outside the boundary around the site. Some are unintentional exclusions, as the 6 inch map was used to draw the cSAC site boundary and there are some

errors between this map and the actual ground as indicated from the aerial photos. There are also some omissions of Annex I habitat due to mistakes in drawing the cSAC boundary and the omission of shoreline areas at several locations, due to the wrong line being used on the OSI 2nd edition 6 inch map.

The saltmarsh was accessed from several points where minor roads pass along the shoreline and access slipways and small piers. The main section of saltmarsh at the east of the site was being grazed by horses and permission to access the site was obtained.

3 SALTMARSH HABITATS

3.1 General description

The main Annex I saltmarsh habitat found on this site is Atlantic salt meadow (ASM) (Table 3.1). Atlantic salt meadow is distributed along both sides of the inner bay. The main section of ASM is located at the head of the inlet with a relatively narrow ribbon of habitat extending along the shoreline. This ribbon develops into more extensive sections of habitat where there is some shelter and the topography is more suitable. There are sections of the shoreline on the north-east part of the inlet where the ribbon of saltmarsh disappears. Mediterranean salt meadow (MSM) is found at one location on the site and is associated with some enclosed pastures grazed by sheep and is part of a farm situated along the southern side of the inlet. There is only a minor amount of mapped *Salicornia* flat habitat on the site located near the western end of the southern side of the mapped area. *Salicornia* flats habitat is also found in very small amounts distributed along the seaward ASM boundary, particularly along the northern boundary and is unmapped. These patches may only be 1-2 m in diameter and are found on mixed muddy sediment.

The saltmarsh transitions to several different habitats along its upper boundary. There is natural transition to upper saltmarsh grassland dominated by Twitch (*Elytrigia repens*) in the largest area of saltmarsh located at the neck of the inner bay. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. Other species present along the strandline and indicating transition to terrestrial vegetation include Spear-leaved Orache (*Atriplex prostrata*), Frosted Orache (*Atriplex lacinata*), Sea Beet (*Beta maritima*), Curled Dock (*Rumex crispus*), Smooth Sow-thistle (*Sonchus oleraceus*) and Common Scurvygrass (*Cochlearia officinalis*). There is also some transition from saltmarsh to scrub (WS1) and Hedgerow (WL1). This section also contains several small mounds within the ASM that also contain CM2 grassland. There is also a small embankment located in the north-west section of this saltmarsh area with CM2 and coastal grassland and ASM on both sides. This embankment may not be natural as an old lane accesses this area. There is also transition to CM2, GS1 and WS1 on the larger islands (Bush Island). There are smaller rocky outcrops that just contain some saltmarsh habitat (Bird Island).

Much of the saltmarsh along the northern side of the inner bay has a rocky seawall adjacent to a minor road along much of its upper boundary. There are dry stone walls on grassy banks along the upper boundary of saltmarsh along the southern side of the inner bay. In some cases the saltmarsh extends behind the dry stone walls into enclosed pasture and there are natural transitions to semi-improved grassland. In some cases the saltmarsh is included within the pasture to protect sheep from the adjacent rocky intertidal areas. Saltmarsh habitats develop into isolated patches of vegetation and isolated plants vegetating a cobble storm beach along the outer shore.

There are transitions to muddy mixed sediment along the seaward boundary of the saltmarsh. There are muddy intertidal mudflats with mixed sediment and scattered rock located at the head of the inlet. The mixed sediment seaward of the saltmarsh contains more gravel and cobble further west to the head of the inlet.

Table 3.1. Area of saltmarsh habitats mapped at Kilcaimin.

EU Code	Habitat	Area (ha)
1310	<i>Salicornia</i> and other annuals colonizing mud and sand	0.015
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	7.818
1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	0.503
	Total	8.336

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

This habitat is found at several locations around the site, although it is not extensive and covers only a minor area. Only one small patch related to pioneer saltmarsh transitioning to vegetation on mixed sediment and cobble beach was mapped during the survey. This patch of habitat is situated on quite stony mixed sediment. These patches may be dominated by either Glasswort (*Salicornia* sp.) or by Annual Sea-blite (*Suaeda maritima*).

Small patches of this habitat can also be found near the upper boundary of the saltmarsh along the northern side of the inlet where deposited strandline debris has rooted and created bare patches of mud. These small patches (< 1 m wide) are re-vegetating with Glasswort.

There are also several patches along the northern boundary that were not mapped as they were too small (1-2 m in width). This *Salicornia* flat habitat is dominated by Glasswort (*Salicornia europaea*) and is situated along the seaward edge of pioneer ASM on quite stony mixed sediment. Some of the stony sediment is not marine in origin but is gravel spill from adjacent coastal protection and road improvement works.

3.3 Atlantic salt meadows (H1330)

The vegetation of this habitat is quite typical and similar to other saltmarsh sites around Galway Bay. Several typical saltmarsh communities are present at this site including a pioneer ASM community. Zonation of the saltmarsh vegetation is also evident and the different communities are best developed in the largest section of saltmarsh. The narrow saltmarsh strips are generally situated on moderately sloped shoreline.

The narrow saltmarsh strip along the northern side of the inlet is less than 5 m wide and is dominated by Common Saltmarsh-grass (*Puccinellia maritima*) with Sea Aster (*Aster tripolium*), Lax-flowered Sea Lavender (*Limonium humile*), Glasswort, Annual Sea-blite, Spear-leaved Orache, Sea Plantain (*Plantago maritima*) and Common Scurvygrass. Sea Purslane is also present but is rare. There is a very narrow pioneer zone sometimes less than 1 m wide along the seaward edge of the ASM with mainly Lax-flowered Sea Lavender along the narrow ribbon of saltmarsh habitat on quite stony or pebbly substrate. There is some Glasswort, Annual Sea-blite, Common Saltmarsh-grass and Sea Spurrey (*Spergularia* sp.) associated with the pioneer zone. The Sea Lavender seems to be spreading down the shoreline on mixed muddy sediment. This may be a response to adjacent coastal protection works.

A typical Red Fescue (*Festuca rubra*)-dominated upper saltmarsh community develops further west along the northern side of the inlet. This community also contains Spear-leaved Orache, Common Scurvygrass, Sea Beet and Sow-thistle along the strandline. This vegetation also contains Creeping Bentgrass (*Agrostis stolonifera*), Autumn Hawkbit (*Leontodon autumnalis*), Lesser Sea-spurrey (*Spergularia media*) and White Clover (*Trifolium repens*) at other locations such as on Bush Island and in the main section. Other species present in this section include Sea Arrowgrass, Sea Pink and Sea Plantain.

A typical mid-marsh vegetation community dominated by Sea Pink (*Armeria maritima*) and/or Sea Plantain is also present on the site and is best developed in the largest section of saltmarsh. It is also present at several other locations including Bush Island. Saltmarsh Rush (*Juncus gerardii*) is also present in a mid-upper saltmarsh community in the largest saltmarsh area. The mid marsh zone also contains Sea Arrowgrass (*Triglochin maritimum*), Common Saltmarsh-grass, Sea Aster, Sea Milkwort (*Glaux maritima*), Lax-flowered Sea Lavender, Red Fescue.

Most of the saltmarsh on the site is not significantly grazed and the vegetation height varies between 0.1-0.2 m high. There is one section where sheep grazing is moderate-high and a very low sward 1-2 cm high has developed.

The saltmarsh topography is moderately well developed in the largest section of saltmarsh located at the head of the inlet. There are some typical irregular pans and a mid marsh topography. This area also contains several mounds and one larger embankment that contain CM2 and GS1 dry coastal grassland. However there are no significant creeks draining the saltmarsh and this may be due to old drains affecting the drainage function. There are few other topographical features within the other saltmarsh habitat, but this is typical of relatively narrow saltmarsh habitat on moderately sloped shoreline.

The saltmarsh cliff varies in nature around the site. There is a typical low saltmarsh cliff (0.3-0.5 m high) along the edge of the main section of saltmarsh at the head of the inlet. There are some erosional features present along this boundary with tussocks and mud balls. The erosion may be poaching induced. There is a much lower saltmarsh cliff around other parts of the site where saltmarsh vegetation transitions to bare intertidal sediment on a natural shoreline slope.

Saltmarsh situated towards the western part of the inlet also contains occasional abundant brown algae on the saltmarsh. Brown algae are also scattered over the saltmarsh along the northern side of the inlet.

3.4 Mediterranean salt meadows (H1410)

This habitat is situated at one location along the western part of the southern side of the inner bay. The habitat is located within some pasture grazed by sheep. It was not surveyed in detail due to livestock on the site and the presence of a high dry stone wall along the outer boundary. This area contains patches dominated by Sea Rush (*Juncus maritimus*). There are also significant patches of Red Fescue-dominated grassland typical of upper saltmarsh.

4 IMPACTS AND ACTIVITIES

Several impacts and activities affect this site, but most have low or neutral intensities (Table 4.1). Most of the site not grazed significantly (140). The northern side is not grazed. The eastern section was grazed by horses in the past but there were few signs of grazing during the site visit. There are signs of poaching in some small areas but it is localized. There is some moderate grazing of saltmarsh along the southern section by sheep. There are areas with a very close cropped sward. The sheep access the saltmarsh along the shoreline from adjacent pastures. In some cases there are sections of saltmarsh that have been enclosed by a dry stone wall (to protect sheep from rocky intertidal area) and the saltmarsh is included within the adjacent pasture. Some of these areas also have minor poaching induced erosion along the seaward boundary (142).

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

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1310	140	C	0	0.015	Inside
1310	871	C	-1	0.001	Inside
1330	140	C	0	6.818	Inside
1330	142	B	-1	1.00	Inside
1330	421	C	-1	0.001	Inside
1330	501	C	-1	0.1	Inside
1330	871	B	-2	0.05	Inside
1330	900	C	-2	0.35	Inside
1410	142	B	-1	0.503	Inside
1410	501	C	-1	0.503	Inside

¹ EU codes as per Interpretation Manual.

² Description of activity codes are found in Appendix III, Summary Report 2007-2008.

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

⁴ Impact is rated as -2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1= natural positive influence and +2 = strongly managed positive influence.

⁵ Location of activity: Inside = activities recorded within and directly impacting the saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

A minor road passes along much of the northern side of the inner bay. There have been significant road improvements and coastal protection works (871) along this road that were carried out in 1999. The height of the road was raised. Large boulders have been placed along the shoreline/edge of the road and there has been infilling behind these rocks. This side of the inlet probably only had a narrow ribbon of habitat prior to these works and most of this ribbon is still intact. However, these works have affected some of the intertidal areas, saltmarsh, transitional CM2 and shoreline habitats along this side of the bay. Smaller rocks and gravel have spilled in places into the intertidal zone.

There has been some recent dumping of soil along the shoreline (421). This is probably related to the accessibility of the shoreline from the adjacent minor road.

There are several tracks that cross the saltmarsh in places (501). The upper shoreline (and saltmarsh zone) is also used as a track at one location and this has eroded the saltmarsh found in this zone somewhat. There are also wheel ruts in some areas where vehicles are accessing the shoreline and farm vehicles are accessing saltmarsh (ASM and MSM) in pastures.

The largest section of saltmarsh located at the head of the inlet has been affected by drainage (810) in the past and this drainage was possibly related to former land enclosure on the saltmarsh. There are also signs of infilling in the past. There are other signs of human use of the saltmarsh zone with dry stone walls crossing the intertidal zone in places. Some of the saltmarsh is protected by old dry stone walls. This was possibly for enclosure of sheep rather than coastal defence as the stone wall is on the saltmarsh near its edge rather than along the seaward boundary. There are signs of coastal defence works in places with rocks piled along the seaward boundary of the saltmarsh in places that may not have been completed. Some of the old enclosures in the intertidal area may be related to sewed collection. This impacts and activities are not assessed as they occurred before the current monitoring period.

There are some indications of erosion at the site (900). There are some signs of erosion along the lower saltmarsh boundary at the head of the inlet. A comparison of the OSI 2nd edition 6 inch map to the OSI 2000 series aerial photos shows that there has been some retreat of saltmarsh in the past 100 years. On average there has been a loss of about 5 m and the loss increases to a maximum of 10-15 m at several points. This

loss of saltmarsh is not assessed as it has mainly occurred outside the current monitoring period. However, it does indicate an erosional trend that is likely to be still be continuing. There are also physical signs of erosion in this section as well with mud balls and tussocks along this saltmarsh boundary. There are also signs of erosion along the northern side of the inlet. One section contains some minor sheep- grazing-induced poaching erosion. The impact of erosion is assessed as having a low negative impact on a portion of the saltmarsh. There are poor prospects for the landward retreat of saltmarsh at this site so the impact of erosion is assessed as having an irreparable influence.

There was no measurable loss of saltmarsh along the main section of saltmarsh at the head of the inlet within the current monitoring period. The presence of a narrow pioneer zone along the northern side of the inlet may be an indication of some natural response of the saltmarsh to the adjacent coastal protection works. There are no indications of accretion (910) around the site.

A new pool has been constructed on the shoreline, located along the western section of the southern side of the inner bay. This is probably related to fishing or aquaculture in the area. The pool has been constructed in an intertidal area adjacent to a narrow saltmarsh ribbon.

Impacts and activities adjacent to the site include dispersed habitation (403), fishing/aquaculture (200) and fertilization (120) and the grazing of livestock (140) related to farming practises.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

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

The overall conservation status of this site is assessed as *unfavourable-inadequate* (Table 5.1). Kilcaimin is a typical relatively small saltmarsh situated in a narrow bay. There are few features of specific notable interest. A species of local distinctiveness (Sea Purslane) is present on the site. One monitoring stop out of a total of ten monitoring stops failed. The site is generally in good condition but the saltmarsh habitat has been affected by road improvement and coastal protection works along one side of the bay. There are indications of an erosional trend affecting the largest section of saltmarsh at the site, although there was no measurable erosion during the current monitoring period. Only a small area of saltmarsh is grazed at a moderate-high intensity by sheep.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are poor-moderate. There is some scope for landward transition of saltmarsh vegetation up slope into brackish CM2 and dry costal grassland at some locations. However, much of the saltmarsh have hard unmoveable features along the upper boundary with no prospects for saltmarsh migration. However, these are very general predictions.

This site is located within the Galway Bay Complex cSAC although not all the saltmarsh habitat is located within the cSAC boundary. An old format NPWS management plan is available for the saltmarsh habitats at this cSAC but it is now out of date.

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

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

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

5.2.1 Extent

The extent of this habitat is assessed as *favourable*. There is only a very small area of this habitat located at this site, although this is quite typical of these small sites. There are no indications of any loss of habitat due to erosion or to land-use changes. This habitat may have been affected by the road improvement and coastal protection works along the northern side of the inlet, but it is very difficult to quantify any impacts due to the very small extent of this habitat at this location.

5.2.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. No monitoring stops were carried out in this habitat due to the small extent present at the site. However, a visual assessment of the habitat indicated that it would probably pass for all attributes. Several ecotypes were present with this habitat appearing along the seaward boundary of the saltmarsh and also appearing as a pioneer community along parts of the strandline.

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 few impacts or activities affecting this habitat at this site, although a very small extent is present. This makes it vulnerable to small changes at the site. The habitat extent is likely to remain small at this site as there are no suitable extensive intertidal mud and sandflats for this habitat.

5.3 Atlantic salt meadows (H1330)

5.3.1 Extent

The extent of this habitat is assessed as *favourable*. There are indications of some possible loss of habitat related to road improvement works and coastal protection along the northern side of the inlet. However, there is no measurable loss of habitat when examining 1995 and 2000 series aerial photos. It is likely that any loss of habitat would be less than 0.07 ha (1% of total habitat area). The site also exhibits some erosional trends but there was no measurable erosion and loss of saltmarsh during the current monitoring period.

5.3.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Ten monitoring stops were carried out in this habitat and one failed. Most of the attributes required for the structure and functions of this habitat reached their targets. The saltmarsh is generally in good condition and grazing is not a significant impact on most of the saltmarsh. The saltmarsh has typical vegetation communities, zonation of vegetation is evident and well-developed in places and one section has a moderately well-developed saltmarsh topography. There are natural transitions to other coastal habitats at both the lower and upper saltmarsh boundaries. The Atlantic salt meadows form part of a larger coastal ecosystem.

The main reason for the failed stops was damage from overgrazing and poaching. This affects about 10% of the total saltmarsh and the actual grazing level only affects the sward height and does not seem to affect diversity. There may also be some sheep-grazing induced erosion off the lower saltmarsh boundary. In addition, other sections of saltmarsh have been damaged by coastal protection works and there are indications of an erosional trend along the seaward boundary of the main section of saltmarsh.

Sea Purslane (*Atriplex portulacoides*) is also present at this site and was recorded at two locations. This is another species of local distinctiveness. This species is mainly distributed along the eastern coast of Ireland and is only found in six 10 km² squares along the west coast (Preston *et al.* 2002). Curtis and Sheehy-Skeffington (1998) have discussed the distribution of this species and hypothesised that its lack of abundance on the west coast compared to the east coast is related to the higher levels of grazing on west coast saltmarshes. The lack of grazing on some of the saltmarshes in Galway Bay may be one of its reasons for its presence on saltmarshes in Galway Bay.

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. There are few impacts or activities of high intensity affecting this site apart from grazing on a small area and an erosional trend. The site is not likely to be further impacted by coastal protection works in the near future as these activities are controlled and licensed by the local authority. Most of the saltmarsh habitats are within a cSAC so the habitat should not be affected by other land-use changes.

5.4 Mediterranean salt meadows (H1410)

5.4.1 Extent

The extent of this habitat is assessed as *favourable*. There is only a very small area of this habitat located at this site, although this is quite typical of these small sites. There are no indications of any loss of habitat due to erosion or to land-use changes.

5.4.2 Habitat structure and functions

No monitoring stops were carried out in this habitat as it was inaccessible. However, a visual assessment of the habitat indicated that it was somewhat damaged by wheel ruts related to farm vehicles and to moderate-high levels of sheep grazing. The structure and functions of this habitat are assessed as *unfavourable-inadequate* due to these impacts.

5.4.3 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. There are few impacts or activities affecting this habitat at this site, although a small extent is present. This habitat is located outside the cSAC boundary and is therefore not protected by nature conservation designation.

6 MANAGEMENT RECOMMENDATIONS

There are no specific management recommendations for the saltmarsh habitats at this site.

7 REFERENCES

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

Curtis, T.G.F. & McGough, H.N. (1988). *The Irish Red Data Book*. Stationary Office, Dublin.

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

8 APPENDIX I

Table 8.1. Areas of SMP habitats mapped using GIS.

SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 <i>Salicornia</i> flats	0.015	0.015				
2	Spartina swards						
3	1330 Atlantic salt meadow	7.378		7.818			
4	1410 Mediterranean salt meadow	0.503			0.503		
5	ASM/MSM mosaic (50/50)						
6	ASM/ <i>Spartina</i> mosaic						
7	1330/other SM (CM2) mosaic						
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	4.558					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)						
11	Isolated <i>Spartina</i> clumps on mud (5%)						
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic						
14	<i>Spartina</i> sward dominated, with some ASM						
15	1310/ <i>Spartina</i> mosaic						
16	ASM dominated with some <i>Spartina</i>						
17	1330/sand dune mosaic						
18	Other SM (CM2)						
19	1330/rocky shore mosaic						
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	12.454	0.015	7.818	0.503		



Legend

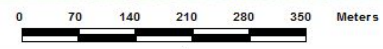
- SAC Boundary
- 1310 Salicornia flats
- 1330 Atlantic salt meadows
- 1410 Mediterranean salt meadows
- other
- 1330 monitoring stops



Saltmarsh Monitoring Project 2007-2008

Kilcaimin
Galway Bay Complex SAC (000268)

SMP code: SMP0092



This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated sites are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 3953)

Date of production: 20/02/2009
Map version: 1

Original Drawing Size: 297 x 420 (A3)
Scale: 1:6500

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

1 SITE DETAILS

SMP site name: Tawin Island	SMP site code: SMP0009	
Site name (Curtis list): Tawin Island	CMP site code:	
	Site No: (Curtis list): 123	
NPWS Site Name: Galway Bay complex	Dates of site visit: 27-28/07/2006	
NPWS designation	cSAC: 268	MPSU Plan: old format
	pNHA: 268	
	SPA: 268	
County: Galway	Discovery Map: 46/52	Grid Ref: 131780, 219260
6 inch Map No: Ga094, Ga102	Aerial photos (2000 series): 03470-c, 03470a-d, 03519-a, 03519-b, 03519-d, 03520-a, 03520-c	
Annex I habitats currently designated for Galway Bay complex cSAC:		
<i>Salicornia</i> and other annuals colonizing mud and sand (1310)		
Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>) (1330)		
Mediterranean salt meadows (<i>Juncetalia maritimi</i>) (1410)		
Other SMP sites within this cSAC/pNHA: none in 2006 (19 Curtis sites listed in Galway Bay)		
Saltmarsh type: Bay	Substrate type: Mud	

2 SITE DESCRIPTION

Tawin Island is located along the central-east side of Galway Bay in Co Galway, 8 km west of Clarinbridge. The island is part of a peninsula that juts into Galway Bay. The island is attached to the mainland via a bridge that crosses intertidal areas that divide the mainland from the island. Tawin Island is made up of glacial deposits and is low-lying. The higher parts of the island contain improved grassland in enclosures divided by stone-walls. The main part of the island contains a small village (Tawin) and there are further scattered dwellings along the minor road that accesses the island.

The island has a complex intricate coastal topography and there are barrier shingle/pebble bars on both sides of the island. These barriers partially enclose intertidal and subtidal areas between the island and the mainland and are possibly classified as lagoons. These barriers are broken in places towards the eastern side of the island and allow the tide to access the intertidal areas (lagoons). However, tide access is restricted so the tidal regime within the lagoons differs from that in Galway Bay. Behind the barriers there is a complex network of saltmarsh, intertidal and grassland habitats that are dependant on elevation and topography. Saltmarsh is generally present along the internal shorelines but this habitat disappears in places and is replaced by rocky outcrops. There are numerous small islands and some larger islands in the intertidal area that also contain saltmarsh habitat, particularly on the north side of the bridge. Sheehy Skeffington and Wymer (1991) stated that the saltmarshes around Tawin Island formed mainly as a result of the sea following glacial till deposits, which were subsequently colonised by saltmarsh species with very little deposition of marine sediment.

Three Annex I habitats, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM) are found at this site. All three are listed as qualifying interests for Galway Bay complex cSAC. Tawin Island is one of 19 saltmarsh sites recorded by Curtis and Sheehy Skeffington (1998) in Galway Bay.

Most of the saltmarsh habitat at Tawin Island is situated within the cSAC. Most of the terrestrial parts of the island have been excluded from the cSAC and the coastal and intertidal habitats are included. Small strips along the landward boundaries are excluded unintentionally, as the 6 inch map was used to draw the cSAC site boundary. This map is slightly inaccurate in places and there are small errors in rectification between the 6 inch map boundaries and the actual boundaries as indicated by the 2000 aerial photo.

Tawin Island was formerly recognised as an Area of Scientific Interest. Tawin Peninsula was also formerly an individual pNHA (1320) before it was amalgamated with several other NHAs to create the Galway Bay complex cSAC/pNHA. Galway Bay SPA also surrounds the island. Most of the terrestrial parts of the island are excluded but much of the intertidal areas are included within the SPA included some saltmarsh. The island is also important for some wintering waders and wildfowl and for some breeding seabirds such as Terns. Tawin Island also used as a haul out for Common Seal (which is an Annex II species).

Tawin Island can be accessed via minor roads leading from Clarinbridge. The coastline and the saltmarsh areas are easily accessed from the minor road that crosses the island. These coastal areas are grazed in commonage by local farmers and permission was sought for access.

The saltmarsh at Tawin Island has been studied in detail in the past (O' Connor 1992). This B.Sc. thesis studied the ecology and land uses of the saltmarsh at Tawin Island and provides valuable baseline information about the saltmarshes including a habitat map.

3 HABITATS

3.1 General description

The saltmarsh habitats are mainly located around the eastern side of the island. However, saltmarsh continues along the inside of the storm beach barrier on the north and south sides of the island extending close to the tip of the island. The saltmarsh habitat is spread over a wide area and is quite fragmented. This is due to the complex coastal topography around the island and peninsula. The saltmarsh is dominated by Atlantic salt meadows (ASM) (Table 3.1). The ASM is generally found as bands of vegetation in hollows following the intricate shoreline. The extent of the ASM varies in places with some wider flat plains with a better developed salt pan and creek morphology.

Mediterranean salt meadows (MSM) are only found at one location on Inishcorra Island, to the south-east of Tawin Island. This small island also contains improved grassland within enclosures marked by dry stone walls. The area outside the enclosures is dominated by saltmarsh and dry coastal grassland, with most of the saltmarsh along the northern side. MSM is mainly located in the north-east section. No Sea Rush (*Juncus maritimus*) was recorded on Tawin Island.

Saltmarsh extends outside the survey area. The survey area was confined to Tawin Island, Inishcorra, Goose Island and a small part of the mainland isolated from the peninsula where the road crosses on to the Tawin Island. Saltmarsh continues along the mainland shoreline and along Glasheen Island, which is part of the storm beach barrier that encloses the southern lagoon. Saltmarshes surveyed by Curtis and Sheehy Skeffington (1998) are also situated to the north and south of Tawin Island along the shoreline of Galway Bay. The survey area was limited due to time constraints affecting the whole survey.

The coastal commonage area along the northern side of the island has a very complex intricate topography with frequent rocky outcrops, exposed patches of glacial deposits and grassy mounds in the saltmarsh area. The grassy mounds that are situated above the high watermark contain dry coastal grassland with affinities to fixed dune grassland. This grassland has calcareous elements such as Ladies Bedstraw (*Galium verum*) and is dominated by Red Fescue (*Festuca rubra*) and Sweet Vernal-grass (*Anthoxanthum odoratum*). The actual saltmarsh extent in this area is only 50% of the total area (Table 3.1).

The ASM and MSM generally transitions to dry coastal grassland along the upper boundaries. At other locations saltmarsh has developed along the storm beach barrier and transitions directly to a pebble or

cobble beach at the upper boundary. Dry stone walls are situated along some of the high water mark in places and divide the coastal area from improved grassland within the fields. There is usually a band of terrestrial grassland between the saltmarsh and the dry stone wall, but not in all cases. In other situations the saltmarsh extends around hollows beyond the walls into the enclosures, depending on the elevation. Saltmarsh is also situated along the edge of rock armour where the road is close to the shoreline. The transition to terrestrial habitats is very distinctive at this site as there is abundant Sea Wormwood (*Seriphidium maritimum*) situated along the upper saltmarsh zone, on the strandline and above the high water mark.

The saltmarsh generally transitions to intertidal habitats at the lower seaward edge. These vary between rocky outcrops, stony sediment and mudflats. The seaward habitat may be a mixture of sediments and rocky deposits. These intertidal habitats follow channels and pools in places where they drain more enclosed areas. The edge of the saltmarsh is generally marked by a low saltmarsh cliff (0.2-0.4 m high). These saltmarsh cliffs show some signs of erosion.

There are small patches of *Salicornia* flats (1310) in some of the intertidal areas particularly in the southern lagoon. Patches of these habitats also occur within the ASM area. This habitat is not extensive.

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

EU Code	Habitat	Area (ha)
1310	<i>Salicornia</i> and other annuals colonizing mud and sand (1310)	1.08
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>)	38.33
1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	1.53
	Total	40.94

*note that saltmarsh habitat continues outside the surveyed site.

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

There are several patches of this habitat situated in the southern lagoon. These patches are colonised by Glasswort (*Salicornia* sp.). There is occasionally frequent Lax-flowered Sea Lavender (*Limonium humile*) and Common Saltmarsh-grass (*Puccinellia maritima*) in these areas. These patches can be classified as pioneer saltmarsh and have colonised gravelly sediment mounds at elevations that are somewhat lower than typical saltmarsh vegetation.

Some areas of shoreline along the edge of the saltmarsh are colonised chiefly by Annual Sea-blite (*Suaeda maritima*). This plant is sparse in places. The substrate is mainly muddy but there are occasionally frequent pebbles and gravel and occasional scattered rocks. This is a pioneer saltmarsh community. There are generally no other saltmarsh species present, although there may be rare Lax-flowered Sea Lavender, Glasswort and Common Saltmarsh-grass. This vegetation forms a zone about 5 m wide (sometimes up to 10 m) along the edge of the saltmarsh. This plant community is a common occurrence along the seaward edge of the saltmarsh at some locations and may only form a strip about 1-2 m wide. These small narrow strips are not mapped so the mapped area is an underestimate of the extent of the habitat.

Annual Sea-blite also colonises substrate dominated by pebbles and shingle. Brown algae (Fucoids) may be frequent. This plant community is not classified as *Salicornia* flats (1310) because the substrate is not sand or mud. The classification between these two communities is not distinct in some places so some patches may not have been mapped as they were considered too stony.

3.3 Atlantic salt meadows (H1330)

This is the most common saltmarsh habitat at Tawin Island. Its structure varies significantly depending on the local coastal topography. ASM occurs as a narrow band found along some shorelines, as wide flat plains with typical saltmarsh creek and pan formation and as complex networks of grassy mounds, rocky outcrops and saltmarsh in hollows of some coastal areas.

Saltmarsh plant zonation is distinctive at this site and several zones are evident in most of the ASM. The upper saltmarsh zone is generally dominated by Red Fescue, Creeping Bentgrass (*Agrostis stolonifera*) and Sea Wormwood with occasionally frequent Saltmarsh Rush (*Juncus gerardii*), Sea Aster (*Aster tripolium*), Sea Milkwort (*Glaux maritima*) and Buck's-horn Plantain (*Plantago coronopus*). Other species occasionally present include Spear-leaved Orache (*Atriplex prostrata*), Autumn Hawkbit (*Leontodon autumnalis*) and Long-Bracted Sedge (*Carex extensa*). This zone was frequently less grazed than the other vegetation. The Sea Wormwood shields the other vegetation somewhat and is unpalatable to livestock. Rocks are frequently scattered through this zone.

There is a distinctive mid-lower saltmarsh zone that is dominated by Sea Pink (*Armeria maritima*) and Sea Plantain (*Plantago maritima*) with frequent Common Saltmarsh-grass. Other species present include Greater Sea Spurrey (*Spergularia media*). Some of the larger flat saltmarsh plains contain this plant community.

The lower saltmarsh zones are dominated by Common Saltmarsh-grass with frequent Lax-flowered Sea Lavender, Glasswort and Annual Sea-blite. There are also small patches of lower saltmarsh vegetation with frequent Annual Sea-blite and Glasswort (*Salicornia* sp.) at the seaward edge, below the saltmarsh cliff. The lower-pioneer saltmarsh zone is not extensive at this site and only occurs in small patches. Some of these patches within the ASM can be classified as *Salicornia* flats when they are dominated by Glasswort and Common Saltmarsh-grass is not frequent. These patches are situated in some of the lower channels and hollows and are dependant on elevation. These patches are generally quite small and are therefore not mapped.

Much of the ASM does not have a typical salt pan or creek topography. The best developed area is located to the south of the island. Saltmarsh has developed along the southern side of the island and along the northern side of the storm beach barrier. Intertidal mudflats are situated between these two sides and widen towards the east. Towards the west the storm beach barrier meets the shoreline of the island and saltmarsh has developed along a small valley or hollow. The intertidal flats narrow to form a channel and several small pools that drain this area towards the east.

Some wide plains have developed on the southern side. This plain does not have frequent salt pans throughout the saltmarsh and salt pans are better developed towards the seaward edge of this plain. This area also contains frequent low hummocks and hollows creating a variable topography and introducing internal plant zonation. The vegetation was dominated by Sea Pink, Sea Plantain and Common Saltmarsh-grass in a lower zone forming a low sward on the mounds. Other species in this plain include Glasswort, Greater Sea Spurrey, Sea Aster and Sea Milkwort. Some of the salt pans are disturbed by grazing and some contain pebbles. This area is drained by some minor creeks. Some of the channels and shallow hollows contain lower saltmarsh vegetation with Glasswort, Annual Sea-blite and Common Saltmarsh-grass. Towards the back of the saltmarsh (the storm beach barrier) Red Fescue dominates the vegetation and there are small amounts of Sea Plantain and Buck's-horn Plantain. The saltmarsh surface of this plain was cracked at the time of the survey and was drying out and possibly suffered from drought (neap tide period). At the back of the marsh there is a low vegetated ridge which contains Sea Wormwood in places and other upper saltmarsh vegetation and this eventually transitions to a cobble/pebble bank. Towards the west the plant zones compress as the slopes increase and the saltmarsh is confined to a narrower area.

ASM saltmarsh is also situated along the northern side of the island behind the storm beach barrier. No intertidal flats have developed in this area and the saltmarsh is confined to a narrow zone between the barrier and the terrestrial land. This area has a complex topography with intricate mounds and hollows. The mounds contain dry coastal grassland and saltmarsh develops in the hollows. Occasionally there are small

pools and channels in the centre of the hollows that act as drainage channels. There is no obvious connection to the shoreline in this area as the storm beach barrier is intact so this saltmarsh is probably flooded from the east. Alternatively this area may not be flooded but the water table may be affected by salt water. The saltmarsh is quite difficult to map in this area because of the intricate topography. The vegetation is dominated by mid and upper saltmarsh plant communities. The vegetation is moderate-heavily grazed and Sea Aster and Lax-flowered Sea Lavender are reduced to tiny leaves.

Continuing to the east along the northern side of the island, the ASM becomes less uniform and rock outcrops appear in the zone between the storm beach barrier and terrestrial grassland. The top of the storm beach barrier is vegetated with dry coastal grassland. The channels also contain exposed rock. The topography is very complex in this area with frequent low mounds with dry coastal grassland, exposed rock, channels and small pools. This area was mapped as a mosaic and the actual ASM area is 50% of the coastal mosaic. The saltmarsh is developed on muddy sediments and these are thin in places. There are some signs of erosion with exposed rock protruding from the sediments and this is likely to be exacerbated by the thinness of the saltmarsh in places overlaying the bedrock. Sea-purslane (*Atriplex portulacoides*) is present in this area growing over some exposed rock and this is a feature of local distinctiveness.

The northern-central section of the island contains a larger intertidal area (lagoon). ASM saltmarsh is mainly situated around the island shoreline and there is less saltmarsh along the back of the storm beach barrier. This area contains frequent small islands within the intertidal area that contain saltmarsh, exposed rock and dry grassland depending on the elevation of these small islands. The traditional saltmarsh topography with creeks, salt pans draining relatively flat plains is not present and this area is typical of much of the saltmarsh found on Tawin Island. Channels are present due to the underlying topography that has created frequent mounds and hollows and some eroded areas in the hollows contain exposed rock and act as pools. The vegetation in this area is similar to that described from the rest of the island. Lower saltmarsh plant communities develop in some of the channels or along the edges of the channels that drain these areas. Plant zonation is distinctive with the vegetation along the bottom of the channel dominated by Common-Saltmarsh-grass with frequent Glasswort. Along the edge of the channel there is a distinctive zone with frequent Lax-flowered Sea Lavender. Then the vegetation transitions to typical mid marsh vegetation dominated by Sea Pink and Sea Plantain. A channel connects the northern side of the island to the southern side and saltmarsh is present on both sides of the channel. This channel divides the saltmarsh into an eastern and western half.

A narrow band ASM saltmarsh has developed around the southern side of Inishcorra Island. This is 5-10 m wide and some plant zonation has developed. The lower edge is dominated by Sea Pink, Sea Plantain and Common Saltmarsh-grass while the upper zone is dominated by Red Fescue and Saltmarsh Rush with a band of Sea Wormwood along the upper boundary next to the dry stone wall/embankment. The saltmarsh is situated along a rocky habitat at the lower edge.

ASM saltmarsh has also developed along the south-east side of the Tawin Island (north of Inishcorra). The landward boundary in this area is a stone wall/embankment along the edge of the road. Some large rocks have been placed along the edge of the road to act at coastal defence. This area is grazed lightly and there is some internal plant zonation along the edges of creeks and pans. The vegetation is dominated by the mid marsh Sea Pink/Sea Plantain dominated vegetation. The tops of some of the low mounds contain vegetation dominated by Red Fescue. A lower marsh zone dominated by Common Saltmarsh-grass and Sea Aster is frequent in some of the channels and hollows. The seaward edge of the saltmarsh is marked by a low saltmarsh cliff and there is a transition to a pioneer saltmarsh community dominated by Annual Sea-blite (mapped as 1310).

ASM saltmarsh is also situated around a small piece of land between the Tawin Island and the mainland. This area is divided by the road accessing Tawin Island and there is a mosaic of dry coastal grassland, exposed rock and saltmarsh on both sides of the island. The topography of the saltmarsh is quite intricate. Saltmarsh on both sides of the road is quite badly poached by cattle. Sea purslane is found on this area of saltmarsh towards the south-west corner. A stone wall/embankment is situated along part of the seaward side of the saltmarsh and some of the saltmarsh behind the wall has been eroded away.

The north-east part of Tawin Island has a complex coastal mosaic along the shoreline. This contains a mosaic of saltmarsh, dry coastal grassland on mounds and rocky outcrops. The topography is very intricate and the actual saltmarsh habitat covers about 75% of the total mosaic area. The saltmarsh in this area is difficult to map due to the topography but some of the larger mounds with dry coastal grassland have been excluded (mapped out) from the saltmarsh area. This area is divided by several dry stone walls. The seaward edge along the northern side is marked by smaller storm beach barriers or rocky mounds inside the main barrier. Saltmarsh may be eroding away from these rocky mounds. Typical saltmarsh topography has not developed significantly in this section. There are some rocky channels that drain this area that act as creeks. However, there are very few pans. Sea Wormwood, indicating upper saltmarsh vegetation, is a predominate feature on this area on many of the mounds, particularly on the eastern side. There are larger areas of mid-zone saltmarsh vegetation dominated by Sea Pink and Sea Plantain towards the western side (northern-central section of Tawin Island).

3.4 Mediterranean salt meadows (H1410)

This habitat is located on Inishcorra Island, to the south-east of Tawin Island. No other Sea Rush was recorded on Tawin Island. The widest part of the saltmarsh is 60 m and this narrows to a 20 m zone. There are small fragments of ASM along the seaward side of the MSM. This vegetation community is dominated by Sea Rush with Red Fescue sometimes abundant. The Sea Rush does not form dense stands with 75-100% cover like those seen at other sites. Other species frequently found include Sea Aster, Creeping Bentgrass, Sea Milkwort and Sea Plantain. There are small amounts of Sea Pink, Common Scurvygrass (*Cochlearia officinalis*), Saltmarsh Rush, Lax-flowered Sea Lavender, Autumn Hawkbit, Common Saltmarsh-grass, Glasswort, Greater Sea Spurrey, Annual Sea-blite, Sea Arrowgrass (*Triglochin maritimum*), Sea Wormwood and Spear-leaved Orache (*Atriplex prostrata*). There are small areas that are mapped as an ASM/MSM mosaic. In these areas the Sea Rush cover decreases (10-20%) and Red Fescue is dominant.

The shoreline outside the enclosures is moderate-steeply sloped. This has allowed some plant zonation to develop, although this does not affect the Sea Rush. At the seaward edge Red Fescue is not present. Sea Aster and Sea Plantain are more common with occasional Common Saltmarsh-grass and Glasswort. Species such as Silverweed (*Potentilla anserina*), White Clover (*Trifolium repens*), Sea Beet (*Beta maritima*), Creeping Bentgrass, Sea Wormwood and Spear-leaved Orache are found around the upper boundary. Occasionally Sea Rush is distributed above the high water mark and this is indicated by the presence of more terrestrial species such as Dandelion (*Taraxacum* sp.) and Birdsfoot (*Lotus corniculatus*). The MSM transitions into dry coastal grassland at the landward boundary in places. Occasionally the dry stonewall/embankment marks the upper edge of the saltmarsh.

Typical saltmarsh topography has not developed in this habitat. Salt pans are relatively rare, although some do occur. There are no creeks. At the lower boundary there is a low saltmarsh cliff (0.3-0.5 m high) that divides the saltmarsh from the adjacent gravely intertidal mudflats.

The vegetation in this habitat is quite lush and the grazing levels are low. This area was grazed by cattle at the time of the survey, although they are unlikely to have grazed this area for long. The sward structure and height is quite variable being mainly between 0.3-0.7 m. A small causeway connects the Inishcorra Island to Tawin Island and is exposed at low tide.

4 IMPACTS AND ACTIVITIES

4.1 Saltmarsh habitats

This site covers a large area and is quite fragmented. This means that impacts and activities on the saltmarsh generally affect parts of the saltmarsh and do not affect the whole site. The main activity is grazing (Table 4.1). Most of the saltmarsh is grazed by cattle and or sheep. The coastal area is held in commonage for farmers on the island but this seems to have been divided up as the grazing level varies in

different sections. Some areas are grazed by cattle but sheep are the most common grazers. Overall, the grazing level is moderate and has created generally short swards in the ASM. One indication of the level of grazing is that the adjacent dry coastal grassland has a taller sward (5-20 cm). Livestock seem to prefer the saltmarsh vegetation compared to the adjacent terrestrial grassland in places. Much of the upper saltmarsh zone has a taller sward and this is because the Sea Wormwood shields the other vegetation somewhat. There are other patches of taller swards in the MSM area and around other parts of the ASM. Overgrazing was not a significant problem at the time of the survey. There are some areas with high levels of poaching, but this type of damage is not extensive. The lower saltmarsh zones are generally the most affected by poaching. Poaching is being caused by cattle with areas grazed by sheep not poached significantly.

There are several other impacts and these generally affect small areas of saltmarsh habitat (Table 4.1). The activity codes used in Table 4.1 are given in brackets in the following text. There has been some old dumping on saltmarsh on Iniscorra Island (422) (MSM). There are frequent grazing tracks across the saltmarsh that are used by livestock (501). There are several tracks used by vehicles and that also act as rights of way to the shoreline to allow seaweed collection (501). Other tracks cross the saltmarsh to allow access to other parts of the shoreline and some of the smaller islands like Iniscorra. Vehicles have created wheel ruts at certain locations but any damage is not significant. The saltmarsh (and other coastal habitats) in the commonage area has been divided up in places and dry stone walls mark the boundaries. Several telegraph poles cross the saltmarsh (511).

The MPSU conservation plan noted that in Tawin West there had been some reclamation of the coastal grassland including parts of the saltmarsh and that some salt pans had been filled with limestone bounders. There were no signs of this reclamation during the survey.

There has been concern about coastal erosion at Tawin Island for the past 10 years. Due to changes in the storm beach barrier particularly along the northern side farmland has been flooded above what used to be the high water mark. Local residents have attempted to repair breaches in the storm beach barrier along the north of the island. The county council have carried out coastal protection works, including reforming part of the storm beach around the island and putting rock armour along the road that accesses the island. Some of the rock armour has been placed on saltmarsh.

A comparison of the 1920's 6 inch map to the 2000 aerial photo indicates that the shoreline around Tawin Island has not changed significantly. This includes the coastal areas within the storm beach barriers. There has been no significant erosion of saltmarsh (900) or loss of extent. There are signs of erosion present along some of the seaward edges with mud balls and frequent saltmarsh cliffs. It is difficult to interpret if this is related to grazing or is poaching induced. Other coastal areas, particularly in the mosaic areas also show signs of erosion with small patches of saltmarsh vegetation on exposed mud overlying exposed bedrock. The mud layer that the saltmarsh vegetation has developed on seems to be eroding away and exposing the bedrock in places. Again it is difficult to interpret if this process is being exacerbated by grazing or if it is a recent natural phenomenon. Small islands present in the sheltered intertidal area to the north of the island where mapped on the 6 inch map and have not changed significantly so this may be an indication that erosion is not a significant process at present.

Recent reports that the tide is covering increasing amounts of coastal grassland and farmland in the past few years may actually be increasing the extent of saltmarsh. The increase in the tide height has been related to recent breaches in the storm beach barriers affecting (increasing) the volume of water that can enter the sheltered intertidal areas (lagoons) and the coastal areas. The tidal regime within these sheltered intertidal areas is different compared to the tidal regime in Galway Bay due to the fact that these areas are flooded by small gaps in the storm beach barriers.

There are few impacts on *Salicornia* flats habitat (1310). This habitat is generally affected by natural geomorphological and tidal cycles. The mounds of muddy sediment that this habitat colonises are dependant on erosion and accretion cycles.

4.2 Adjacent to the saltmarsh habitats

The main activities that occur adjacent to the saltmarsh habitats are related to farming. These include grazing of cattle and sheep in the coastal commonage area (140). There has been some improvement of grassland within enclosures adjacent to the saltmarsh in places (120) (estimated that 50% of the saltmarsh is situated adjacent to improved fields). Some of the intertidal zone is used for aquaculture with oyster trestles present (200). However, this is not extensive. There are several dwellings scattered over the island (403) and Tawin Village is situated close to the saltmarsh (401). The island is serviced by a single minor road and this is situated close to the saltmarsh in places (502) (estimated to affect 10% of the ASM).

There has been some dumping of gravel and stones in the north-west part of the island. This is presumably being used to repair gaps in the storm beach barrier. The local council have also carried out coastal protection works on habitats adjacent to saltmarsh (871) along the road. Coastal protection works may impact on the saltmarsh by increasing erosion. The MPSU conservation plan noted that some of the storm beach barrier has been excavated (302) to extract gravel and aggregate (estimated to be a minor area < 0.01 ha).

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

EU Habitat Code ¹	Activity code ²	Intensity ³	Impact ⁴	Area affected (ha)	Location of activity ⁵
1310	140	C	0	1.08	Inside
1330	140	B	-1	38.33	Inside
1330	143	A	-1	5.4	Inside
13s	422	C	-1	< 0.001	Inside
1330	501	C	-1	< 0.1	Inside
1330	511	C	-2	< 0.01	Inside
1330	900	C	0	38.33	Inside
1410	140	C	-1	1.53	Inside
13s	120	C	0	17	Outside
13s	140	C	0	40.94	Outside
13s	302	C	0	< 0.01	Outside
13s	401	C	0	40.94	Outside
13s	403	C	0	40.94	Outside
1330	502	C	0	3.8	Outside
1330	871	C	-1	< 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 a moderate or *unfavourable-inadequate* conservation status (Table 5.1). Four stops failed out of twenty-three monitoring stops divided between the three habitats. The most significant activity on this site is sheep grazing. The overall grazing pressure on this site is moderate but the intensity of the grazing pressure varies as the saltmarsh is quite fragmented and is spread over a larger area. This has created a typical close-cropped sward over much of the saltmarsh. In most of the site the grazing intensity is not negatively affecting the saltmarsh. Some local areas are heavily grazed by sheep and some areas are also heavily poached by cattle, particularly the lower saltmarsh zones.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are moderate. However, these are very general predictions. Much of the saltmarsh on Tawin Island has a complex topography with frequent small mounds. There are significant amounts of low-lying land in the coastal areas to allow migration of saltmarsh habitats up slope. The tidal regime within the intertidal areas behind the storm beach barriers further complicates any predications. There are already some reports that the high tide level within the storm beach barriers has increased in the recent past (since 1990) and that coastal land and farmland that previously was never inundated had been inundated by the tide for increasing amounts of time. However, rises in sea level are likely to erode some of the saltmarsh at the seaward side. The creation of new saltmarsh habitat may compensate for the loss of eroded saltmarsh. This site would probably benefit from a more detailed study of the relationship of the saltmarsh to the tidal regime within the storm beach barriers and the impact of the erosion of these barriers on this tidal regime.

A MPSU conservation plan is available for the saltmarsh habitats at this cSAC.

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

Habitat	EU Conservation Status Assessment			Overall EU conservation status assessment
	Favourable	Unfavourable - inadequate	Unfavourable - Bad	
<i>Salicornia</i> 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 assessed as *favourable*, in the absence of no information on the previous extent of this habitat at this site. This habitat was added as a qualifying interest to the cSAC because previous surveys had recorded Glasswort and Annual Sea-blite on saltmarshes in Galway Bay and it was assumed that this habitat was present.

5.2.2 *Habitat structure and functions*

The structure and functions of this habitat is assessed as *favourable*. Three monitoring stops were carried out in this habitat and they all passed. All the attributes required for the structure and functions of this habitat reached their targets. This habitat generally is located on intertidal substrates along the edge of ASM saltmarsh or on isolated mounds of sediment along mounds. The substrate this habitat has colonised is much more stony compared to other sites. The stonier substrates were dominated by Annual Sea Blite and muddier substrates were dominated by Glasswort. Some plant communities dominated by Annual Sea-blite were not classified as this habitat as the substrate was too stony and dominated by pebbles.

There are no signs that this habitat is being affected by erosion or accretion. There are no accretional ramps leading from the ASM to this habitat and the two habitats are generally separated by a saltmarsh cliff.

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 however prone to sudden erosion or accretion in response to geomorphological cycles or storm events.

5.3 Atlantic salt meadows (H1330)

5.3.1 *Extent*

The extent of this habitat is assessed as *favourable*. There is no evidence to suggest that there has been any recent loss of extent due to erosion or other impacts. The MPSU conservation plan noted that there had been some reclamation of coastal grassland including saltmarsh in Tawin West (pre-1992). However, there were no signs of this reclamation work during the survey. The extent of any habitat lost must be quite small otherwise the reclamation would have been noted. A comparison of the 2000 aerial photo to the 1920s 6 inch map indicates that there has been no significant loss of extent of saltmarsh during this period. Even though there are signs of erosion along the seaward edge of much of the ASM there have been no significant areas of saltmarsh that have been eroded away. Reports of increased tidal inundation over farmland and coastal land that previously was never affected by the tide may actually have increased the extent of saltmarsh in recent times.

A more detailed study is required to accurately assess the amount of coastal grassland and farmland that has been recently affected by the changing tidal levels. This study should be carried out in conjunction with the local landowners. It is difficult to assess accurately the amount of land that has been possibly converted to saltmarsh in the recent past without more accurate baseline data.

5.3.2 *Habitat structure and functions*

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Nineteen monitoring stops were carried out around the island and fifteen stops passed (78%). The other four stops did not reach targets for levels of grazing and poaching, and bare substrate cover. These four stops are located in areas that have been either grazed very heavily by sheep or have been poached and grazed heavily by cattle. The

damaged sections cover an area of 5.2 ha (15% of the total ASM). The sward height is generally quite low in the lower and mid marsh zones. However, the upper marsh frequently has a taller sward due to the presence of Sea Wormwood. O'Connor (1992) stated that the grazing levels were not excessive and grazing is likely to increase the species diversity of the saltmarsh communities.

The extent of the saltmarsh and the fact that it is spread over a relatively large area around the island adds to the diversity of the site. This factor means that some of the impacts such as grazing vary in intensity. Many of the other sites surveyed are situated in one management unit and therefore the grazing level is uniform. There are several other activities on the ASM at this site such as coastal protection works, tracks and wheel rut damage but these activities are not having a significant impact.

Other attributes such as plant zonation and plant diversity reached their targets. This site has a typical species diversity. Plant zonation was particularly well-developed and was dependant on elevation. The saltmarsh, particularly along the northern side of the island has a very complex topography and forms a mosaic with coastal grassland on the tops of mounds, exposed rock outcrops and patches of pebbles and cobbles. Internal zonation is particularly well-developed along the sides of these mounds. The mid marsh and upper marsh communities are the most abundant. The lower and pioneer saltmarsh communities are less frequent and this is related to the topography of the site. There are no accreting ramps for a pioneer zone to develop. The lower and pioneer zones are best developed along some of the shallow channels and hollows that drain the various saltmarsh sections but their extent is quite small. Occasionally there are patches of Glasswort and Annual Sea-Blite that are situated on stony substrates at the seaward edge of the saltmarsh.

O'Connor (1992) recorded that vegetation of the saltmarsh communities in considerable detail. A comparison of these descriptions to this survey indicates that the species assemblages have remained the same. The reduced extent of the lower saltmarsh community dominated by Common Saltmarsh-grass was also noted by O'Connor (1992). One important feature, Turf fucoids, was recorded by O'Connor (1992). This feature was not recorded during this survey but was likely to have been missed rather than not been present.

The saltmarsh habitats form part of a larger coastal ecosystem. There are natural transitions to other habitats at both the upper and lower saltmarsh boundaries. At the lower boundary there are extensive intertidal mudflats that are frequently quite stony. Exposed rock, shingle and pebble deposits are also frequently found in the intertidal area and the saltmarsh transitions to these habitats. The upper landward boundary of the saltmarsh was dominated by dry coastal grassland. This habitat frequently formed small patches on the tops of mounds that were surrounded by saltmarsh in the lower hollows. Some of the saltmarsh situated along the stone beach barriers transitions directly to stony banks.

This site has several features of local distinctiveness. The site is notable for the abundance of Sea Wormwood along the upper boundary. This species has a scattered distribution in Ireland and was only found recently in eight 10 km² squares around the coast of Ireland (Preston *et al.* 2002). Webb *et al.* (1996) described its distribution as rare and very local although it is not recorded as a rare species in The Red Data Book (Curtis & McGough 1988).

Sea-purslane (*Atriplex portulacoides*) is also present at this site and was recorded at two locations. This is another species of local distinctiveness. This species is mainly distributed along the eastern coast of Ireland and is only found in six 10 km² squares along the west coast. Curtis and Sheehy-Skeffington (1998) have discussed the distribution of this species and hypothesised that its lack of abundance on the west coast compared to the east coast is related to the higher levels of grazing on west coast saltmarshes. O'Connor (1992) noted that the western location was ungrazed during that survey and that grazing can deplete this species. This area is currently being grazed and there is some heavy poaching by cattle in parts. Long-term grazing is likely to affect the abundance of this species. Sea-purslane is distributed on exposed rock at the western location and this may shield it somewhat from heavy grazing. This species was also noted during the survey outside the survey area along the shoreline at Lacanaloy Creek in Mweeloon.

The typical creek and salt pan topography found on saltmarshes is not well represented at this site. This is related to the complex underlying topography as the saltmarsh overlies glacial deposits that form numerous mounds. The distinctive coastal geomorphology with the high storm beach barriers that shelter the island, the saltmarsh habitats and isolate large intertidal areas within the barriers is also very important. However, this adds to the diversity of the site. Typical saltmarsh topography with creeks and salt pans is present along the southern storm beach barrier where the widest flat plains have developed. Some of the saltmarsh along the north-western side of the island has a complex drainage system as it is isolated from the shoreline by a high storm beach barrier. This saltmarsh is likely to flood from the east, where breaks in the barrier flood a larger intertidal area. The lowest part of these coastal systems has pools and channels, which act to drain the saltmarsh and surrounding coastal grassland.

No Common Cordgrass (*Spartina anglica*) was recorded in this habitat.

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. Grazing is the main impact on this site but the intensity varies. Most of the site has moderate grazing levels and they are not affecting the saltmarsh significantly. There are some localised areas that have been damaged by heavy grazing by sheep or cattle. Some reduction in grazing is required in these localised areas to allow these areas to recover.

There is no evidence that the habitat extent will be significantly reduced in the near future.

5.4 Mediterranean salt meadows (H1410)

5.4.1 Extent

The extent of this habitat is assessed as *favourable*. This habitat is only found on Iniscorra Island located to the south-east of Tawin Island. A Sea Rush-dominated saltmarsh community was noted by O'Connor (1992) at this location. A saltmarsh cliff marks the seaward boundary but there is no evidence that there has been any loss of extent from a comparison of the 1920's 6 inch map to the 2000 aerial photo.

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. All the attributes reached their targets. This habitat has a typical species assemblage. One distinctive feature is that Sea Rush is not as abundant compared to other sites and Red Fescue and other saltmarsh species are prominent parts of the vegetation. Plant zonation is a notable feature in this habitat and zonation is not always seen because the habitat is generally quite uniform and dominated by Sea Rush. This habitat is grazed by cattle but the grazing intensity was low and there were no signs of poaching. There are few other impacts on this habitat.

The MSM is situated on a relatively steep slope. Typical saltmarsh topography is not well-developed and only a few salt pans are present, but this is due to its situation on a relatively steep slope. There is a natural transition to dry coastal grassland at the landward boundary. No Common Cordgrass (*Spartina anglica*) was recorded 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 the main impact on this site but its current intensity is low. There is no evidence that the habitat extent will be significantly reduced in the near future.

6 MANAGEMENT RECOMMENDATIONS

Grazing is the main activity on this site and overall is at a moderate level. Most of the saltmarsh is grazed to some extent. In some specific areas the grazing intensity should be reduced but this is not required for the whole site. Removing grazing as an impact from a small part of the site (set-a-side) would also be beneficial as this would increase the sward diversity particularly in the middle and lower marsh areas, which are generally preferentially grazed and so are even affected at low stocking levels. Any exclosures would be likely to be grazed by wild animals and wintering waders and wildfowl.

Coastal protection is ongoing on Tawin Island. The impact of any future coastal protection works on the saltmarsh habitat should be assessed.

7 REFERENCES

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Appendix IX – Tyrone House-Dunbulcaun Bay site report and habitat map from the Saltmarsh Monitoring Project (McCorry & Ryle 2009)

1 SITE DETAILS

SMP site name: Tyrone House-Dunbulcaun Bay	SMP site code: SMP0091
Dates of site visit 11&12/10/2007	CMP site code: N/A
SM inventory site name: Tyrone House-Dunbulcan Bay	SM inventory site code: 124
NPWS Site Name: Galway Bay Complex	
NPWS designation cSAC: 000208	MPSU Plan: old format plan available
pNHA: 000208	SPA: 004031
County: Galway	Discovery Map: 52 Grid Ref: 138970, 218400
Aerial photos (2000 series): O 3471-D; O 3472-C; O 3521-B,D; O 3522-A,C,D	6 inch Map No: Ga103
Annex I habitats currently listed as qualifying interests for Galway Bay Complex cSAC:	
H1310 Salicornia and other annuals colonizing mud and sand	
H1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	
H1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	
Other SMP sites within this SAC/NHA: Scanlan's Island, Kinavarra West, Kileenaran, Kilcainin, Oranmore North, Roscam West & South, Seaweed Point, Barna,	
Saltmarsh type: Estuary	Substrate type: Mud/Peat

2 SITE DESCRIPTION

Tyrone House-Dunbulcaun Bay saltmarsh is located at the eastern side of Galway bay in Co. Galway. This saltmarsh site is one of the several saltmarshes that have developed in the long narrow inlets found on this part of Galway Bay. It is one of 19 Saltmarsh Inventory sites listed in Galway Bay and the only estuary type saltmarsh (Curtis & Sheehy-Skeffington 1998). Dunbulcaun Bay divides into two narrow inlets with Clarinbridge River in the north and the Kilcolgan River estuary to the south. This site covers a significantly long shoreline, even though the total area of saltmarsh habitat is relatively low to moderate compared to other habitats. The survey site extends from Clarinbridge in the north to Kilcolgan Bridge in the south. Much of the shoreline within the survey site does not contain any saltmarsh, or only a minor narrow band of saltmarsh on steep-sided cobbles or rocky deposits. Both inlets contain estuary type saltmarsh. Saltmarsh is best developed at Tyrone House and along both sides of the Kilcolgan River estuary. Tyrone House is an old abandoned estate house located in the south-west section of the survey site.

Most of the area around the site is quite rural although there is some ribbon development in places along minor roads in the area and frequent dispersed habitation. The Clarinbridge River inlet extends to the town of Clarinbridge. The area is relatively low-lying and dominated by agricultural grassland although there are also some patches of semi-natural vegetation, with scrub and dry grassland related to rocky outcrops. There is also some transition to wet grassland and tall Reedbeds along the two rivers and inlets.

The site is located within the Galway Bay Complex candidate Special Area of Conservation (cSAC 208). Two Annex I habitats are present at this site, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). Both of these habitats are listed as qualifying interests for the Galway Bay Complex cSAC. Two species of local distinctiveness, Sea Purslane (*Atriplex portulacoides*) and Sea Wormwood (*Seriphidium*

maritimum), are found at the site. Most of the saltmarsh habitats mapped at this site is located within the cSAC boundary. However, there is a substantial amount of saltmarsh Annex I habitats located outside the boundary around the site. Some are unintentional exclusions, as the 6 inch map was used to draw the cSAC site boundary and there are some errors between this map and the actual ground as indicated from the aerial photos. There have been some changes in the intertidal zone since the OSI 6 inch map was drawn. However, in other cases the wrong shoreline boundary was used and this has excluded saltmarsh and in other cases the saltmarsh is not indicated on the OSI 6 inch map.

A new quay and holding pond for shellfish fisherman is being constructed along the shoreline adjacent to Tyrone House. This quay was being inspected by an official from the Department of the Marine at the time of the survey to see if it was complying with planning regulations.

The site was accessed via several points along the shoreline. Some private land was crossed to the survey the saltmarsh habitats. Permission was sought to cross the private land. A large section of the site along the southern side of the Kilcolgan River inlet was not surveyed in detail as permission to access the land was denied.

3 SALTMARSH HABITATS

3.1 General description

The main Annex I saltmarsh habitat found on this site is Atlantic salt meadow (ASM) (Table 3.1). However, this is one of the few sites surveyed in Galway Bay that has a significant amount of Mediterranean salt meadow habitat. The MSM habitat is only found along the Kilcolgan River inlet whereas the ASM is found in both inlets. Saltmarsh habitat is best developed in the more sheltered inner section of the inlets. There is less saltmarsh development along the more exposed and steeper shorelines around the outer parts of the inlets. The various saltmarsh communities also form complex mosaics at some locations on the site that were difficult to map and were therefore mapped as mosaics.

The shoreline varies significantly within the survey site, as the survey site covers a relatively long section of shoreline. This affects the saltmarsh diversity and increases the diversity of the topography and seaward and terrestrial transitions from the saltmarsh to the various other habitats.

Atlantic salt meadow habitat is distributed along the shorelines of the Clarinbridge River inlet. The saltmarsh development is generally poor and there is a narrow band of saltmarsh vegetation (about 5 m wide) stretching along the shoreline in the intertidal zone. There are some low-lying flatter sections of the shore where the intertidal zone is wider and there is increased saltmarsh extent over a zone up to 50 m wide that is enclosed in pasture grazed by livestock. The seaward boundary has been modified in places and dry stone walls have been built along the shoreline. Some of these large limestone boulders may have been placed along the shoreline after land improvement in adjacent areas. These boulders have been used to create dry stone walls along the shoreline to protect livestock from the rocky intertidal zone.

The inner part of the Clarinbridge River inlet contains frequent large scattered rocks in the intertidal zone, creating an extensive boulder field covered with brown Wrack. The saltmarsh transitions to semi-improved agricultural grassland along its upper boundary, where the saltmarsh is enclosed within pasture. Further west towards the outer part of the inlet the saltmarsh is situated along a narrow strip that is confined by an earth bank/dry stone wall or hedge marking the terrestrial boundary.

The outer part of the peninsula between the Clarinbridge River and the Kilcolgan River inlets is much more remote. The shoreline is generally quite steep and this does not allow significant development of saltmarsh habitat. The saltmarsh habitat is confined to a narrow strip of vegetation that has developed on a thin band of sediment and may be eroding in places, exposing the under-lying cobbles that dominate this shoreline. There are frequent scattered rock and cobbles on the saltmarsh vegetation and a rocky/ASM mosaic is

present at various locations. There is a transition to terrestrial band of vegetation containing Sea Beet (*Beta maritima*), Spear-leaved Orache (*Atriplex prostrata*), Sea Mayweed (*Tripleurospermum maritimum*), Sea Radish (*Raphanus* sp.) and Twitch.

Both ASM and MSM become somewhat better developed along the inner more sheltered parts of the Kilcolgan River inlet and at Tyrone House in low-lying intertidal areas. The saltmarsh habitat may cover a zone up to 100 m wide. There are transitions to mixed muddy sediment along the seaward boundary and a saltmarsh cliff has developed along much of this saltmarsh. There are transitions to agricultural grassland along the landward boundary of some of the larger saltmarsh sections, as well as transitions to earth banks/ditches that mark the terrestrial boundaries of the shoreline. At some locations there may be a narrow zone of Twitch (*Elytrigia repens*)-dominated upper saltmarsh vegetation on the landward side of the saltmarsh strip on these steeper banks. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. Muddy intertidal sediments have developed along the sheltered section of saltmarsh at Tyrone House.

The saltmarsh vegetation becomes more brackish towards the head of the inlets and this is more pronounced in the Kilcolgan River inlet. The vegetation communities are quite complex with mosaics of ASM vegetation, MSM vegetation, Twitch-dominated vegetation and stands of Sea Club-rush (*Bolboschoenus maritimus*) and Common Reed (*Phragmites australis*) in close association with each other. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. These different communities have developed along modified shoreline near Kilcolgan Bridge where there are a series of drainage channels, old embankments and mounds close to the main river channel creating different elevations. The edge of the main river channel has been modified in the past and has been strengthened in places.

Atlantic saltmarsh vegetation develops along the edges of the channels and the higher mounds contain Twitch-dominated grassland or dry grassland (GS1) where it is higher. Stands of Sea Club-rush and Common Reed develop on flatter areas along side the main channel. This area has been modified in the past and there are also some ruined buildings on both sides of the estuary on low mounds. Several mosaics were used to map some of this complex vegetation found at the head of Kilcolgan River inlet.

The saltmarsh cliff varies with low boundaries (0.1-0.2 m high) along the narrow bands of saltmarsh located at the western end around the outer ends of the inlets. There are taller saltmarsh cliffs (0.5-1 m high) further east along the inlets, where it is more sheltered and more sediment has built up or has not eroded, particularly along the seaward edge of the MSM.

Table 3.1. Area of saltmarsh habitats mapped at Tyrone House- Dunbulcaun Bay.

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	9.933
1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	8.409
	Total*	18.342

*note that saltmarsh habitat continues outside the mapped area.

3.2 Atlantic salt meadows (H1330)

The vegetation communities found in this habitat are similar to other saltmarsh sites around Galway Bay. The relatively long shoreline within the survey area increases the diversity of the saltmarsh zone by including several different saltmarsh types. There are no large areas of extensive ASM development at this site and

the widest zone is 30-40 m wide. This means the saltmarsh topography is poorly developed. Only some sections have small creeks or channels that drain various sections of saltmarsh.

Zonation is evident even in the narrower sections of saltmarsh. The lower zone contains Common Saltmarsh-grass (*Puccinellia maritima*) and Lax-flowered Sea Lavender (*Limonium humile*) with Annual Sea-blite (*Suaeda maritima*), Sea Aster (*Aster tripolium*) and Sea Plantain (*Plantago maritima*). There are occasional Sea Aster, Sea Plantain, Common Saltmarsh-grass and Lax-flowered Sea Lavender colonising muddy cobbles along the seaward edge of the narrower saltmarsh sections. Sea Rush (*Juncus maritimus*) is also present in this habitat at low cover values around the areas containing MSM.

The upper saltmarsh zone is dominated by Red Fescue (*Festuca rubra*). Other species present include Creeping Bent-grass (*Agrostis stolonifera*), Long-bracted Sedge (*Carex extensa*), Common Scurvygrass (*Cochlearia officinalis*), Curled Dock (*Rumex crispus*) and Autumn Hawkbit (*Leontodon autumnalis*). The habitat zone is found near the Kilcolgan Bridge and forms a complex mosaic with upper saltmarsh vegetation (CM2) dominated by Twitch and containing transitional terrestrial species like Smooth Sow-thistle (*Sonchus oleraceus*) and Curled Dock. Some of this area is not grazed and the vegetation is rank. The ASM saltmarsh zone also forms mosaics with stands of Common Reed.

Atlantic salt meadow habitat is also moderately well-developed around Tyrone House shoreline. Several zones are present at this location and zonation is evident. Some pioneer vegetation dominated by Lax-flowered Sea Lavender is colonising along the lower seaward boundary of the ASM. The lower zone is dominated by Common Saltmarsh-grass and the upper zone is dominated by Red Fescue. Glasswort (*Salicornia* sp.), Annual Sea-blite and Sea Arrowgrass (*Triglochin maritimum*) are present in the lower zone. A mid zone *Armeria-Plantago* sward has also developed in this section and there are several small pans present. This saltmarsh is not grazed but is tussocky, indicating older grazing damage. A saltmarsh cliff develops along part of the seaward boundary in this section. This habitat is also found on several small islands isolated from the main shoreline at this location.

ASM habitat is also found in a small sheltered inlet to the east of the new quay. This inlet has been cut off from the sea by the construction of a new seawall to create a holding pond for shellfish. ASM habitat is located at the eastern landward end of the small lagoon. This area contains mainly lower zone ASM dominated by Common Saltmarsh-grass and is heavily poached.

This habitat is also found in the Clarinbridge River inlet. Some of the saltmarsh is included within pastures and is grazed moderately by cattle. There are occasional small pans in this saltmarsh and some sections are drained by a single creek or channel. The ASM vegetation is similar to other parts of this site. However, Bucks-horn Plantain (*Plantago coronopus*) forms a prominent part of the upper zone along with Red Fescue in this section. Other species present include Sea Milkwort (*Glaux maritima*), Autumn Hawkbit, Sea Pink (*Armeria maritima*), Creeping Bentgrass, Broad-leaved Plantain (*Plantago media*), White Clover (*Trifolium repens*) and Saltmarsh Rush (*Juncus gerardii*). This ASM contains frequent scattered rock in places.

Some of the ASM further north towards Clarinbridge is not grazed and a rarer transitional terrestrial vegetation type is present containing rougher grasses including Tufted Hair-grass (*Deschampsia caespitosa*), Silverweed (*Potentilla anserina*), False Oat-grass (*Arrhenatherum elatius*) and False Fox Sedge (*Carex otrubae*).

Much of the narrow saltmarsh strip along the outer part of the Clarinbridge River estuary is moderately poached and tussocky. There are also occasionally frequent loose rocks scattered over this saltmarsh and much of it is mapped as a mosaic. There are sections where Saltmarsh Rush and Red Fescue are co-dominant in the upper zone. The topography of this narrow saltmarsh strip is poorly developed with no pans. The northern shoreline is also quite rocky and some sections do not contain any saltmarsh.

Sea Wormwood and Sea Purslane were recorded at this site but are quite rare in frequency. Both these species were recorded on the narrow saltmarsh strips towards the outer sections of the inlets. Sea Wormwood is growing amongst rocks on the shoreline.

3.3 Mediterranean salt meadows (H1410)

This habitat is situated in the Kilcolgan River estuary and forms some of the largest sections of saltmarsh on this site. Several extensive stands dominated by Sea Rush (*Juncus maritimus*) have developed. There are also several areas with a mixture of patches dominated by Sea Rush and patches dominated by ASM. The density of Sea Rush varies between 20% to 75% cover. Red Fescue and Creeping Bentgrass are both frequent or abundant within this habitat. Other species present include Autumn Hawkbit (*Leontodon autumnalis*), Sea Aster, Common Scurvygrass, White Clover, Sea Arrowgrass, Long-bracted Sedge and Bucks-horn Plantain. Some zonation is evident within this habitat and Sea Rush is found in both an upper zone with co-dominance of grasses and a lower zone with more frequent Sea Plantain.

There are few signs of saltmarsh topography in this habitat, although some of the sections are drained by single creeks or channels. A relatively tall saltmarsh cliff has developed along the seaward edge of this habitat. The lower zone of this habitat is somewhat heavily poached and quite tussocky in places.

4 IMPACTS AND ACTIVITIES

There are several impacts and activities that affect this site (Table 4.1). The main impact is cattle grazing (140) and different sections have different grazing intensities related to different land-holdings and different management regimes. Several areas have moderate-high grazing intensities and there is some poaching damage in both the ASM and MSM (143). Other sections are not grazed at all and contain rank grassland.

Table 4.1. Intensity of various activities on saltmarsh habitats at Tyrone House- Dunbulcaun Bay.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1330	140	C	-1	5.933	Inside
1330	143	B	-1	4.000	Inside
1330	421	C	-1	0.001	Inside
1330	501	C	-1	0.500	Inside
1330	871	A	-1	0.700	Inside
1330	900	C	0	0.5	Inside
1410	140	C	-1	5.409	Inside
1410	143	B	-1	3.000	Inside
1410	900	C	0	0.4	Inside

¹ EU codes as per Interpretation Manual.

² Description of activity codes are found in Appendix III, Summary Report 2007-2008.

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

⁴ Impact is rated as -2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence.

⁵ Location of activity: Inside = activities recorded within and directly impacting the saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

A new quay and holding pond is being constructed at Tyrone House. A seawall was being constructed across a small inlet to dam it and create a lagoon. The development of the new pond and seawall (871) will probably affect tidal inundation behind the seawall and therefore affect the extent and structure and function

of the saltmarsh behind this area. This development was being inspected during the field survey by an official from the Department of the Marine to see if it complied with planning regulations.

There are several tracks that cross the saltmarsh in places (501). The upper shoreline (and saltmarsh zone) is also used as a track at one location and this has eroded the narrow strip of saltmarsh found in this zone somewhat. There are also wheel ruts in some areas where vehicles are accessing adjacent pastures via the shoreline (ASM).

Erosion (900) at the site is not significant. A comparison of the OSI 2nd edition 6 inch map to the OSI 2000 series aerial photos shows that there have been no significant losses of saltmarsh and no measurable erosion in the past 100 years. There are some signs of erosion along the seaward boundary of the saltmarsh at various locations with tussocks along the saltmarsh cliff. However, there was no measurable erosion of saltmarsh during the current monitoring period. Erosion is assessed as having a negative impact on a small portion of the saltmarsh face.

Limestone boulders line to the lower saltmarsh boundary at one location in Clarinbridge River inlet. These large boulders are likely to have been placed along the seaward boundary during land improvement, after being cleared from adjacent agricultural land. There may be some element of coastal protection from these walls (871). The impacts of these walls are not assessed as they occurred outside the current monitoring period. Older dry stone walls with smaller sized rocks are also present. These stone walls have been built to enclose pasture and protect livestock from extensive boulder fields in the intertidal zone.

There has been some dumping of stone and spoil on saltmarsh at one location on this site adjacent to a minor road/track along the shoreline (421).

The Kilcolgan River channel has been modified in the past and these modifications are related to drainage of the surrounding area. The brackish habitats are likely to have extended further than the Kilcolgan Bridge in the past. Some of these drainage works date back to the 19th century.

Impacts and activities adjacent to the site include urbanised areas (400), discontinuous urbanisation (402), dispersed habitation (403), forestry (160), amenity use of the Kilcolgan River estuary by canoeists (620), fishing/aquaculture (200) and fertilization (120) and the grazing of livestock (140) related to farming practises.

5 CONSERVATION STATUS

5.1 Overall Conservation Status

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

The overall conservation status of this site is assessed as *unfavourable-bad* (Table 5.1). Tyrone House-Dunbulcaun Bay covers a large area but only has a moderate extent of saltmarsh habitat. There are several features of interest. This site is the only Estuary type saltmarsh present in Galway Bay and there are complex transitions to brackish and freshwater habitats, particularly near the head of the Kilcolgan River estuary. There are also several species of local distinctiveness (Sea Purslane and Sea Wormwood) present on the site, but both are quite rare. There are few impacts or activities affecting this site apart from grazing and poaching damage by cattle. A small area of saltmarsh is possibly at risk from the construction of a new seawall and holding pond for shellfish at Tyrone House. Erosion at this site is not significant.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are good. There is some scope for landward transition of saltmarsh vegetation up the estuary into low-lying fields containing wet grassland. However, these are very general predictions.

This site is located within the Galway Bay Complex cSAC. An old format NPWS management plan is available for the saltmarsh habitats at this cSAC but it is now out of date. A small amount of saltmarsh habitat at this site is situated outside the cSAC boundary (1.62 ha or 9%).

Table 5.1. Conservation status of Annex I saltmarsh habitats at Tyrone House-Dunbulcaun Bay.

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

5.2 Atlantic salt meadows (H1330)

5.2.1 Extent

The extent of this habitat is assessed as *favourable*. There is only a very small area of this habitat located at this site, although this is quite typical of these small sites. There are no indications of any loss of habitat due to erosion or to land-use changes.

5.2.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Nineteen monitoring stops were carried out in this habitat and three failed (15%). Most of the attributes required for the structure and functions of this habitat reached their targets. The saltmarsh is generally in good condition apart from poaching damage caused by moderate levels of cattle grazing at several locations. Poaching exposes bare mud and sediment and damages the sward structure, particularly in the lower saltmarsh zone. There are also signs of poaching-induced erosion along the narrow saltmarsh strips. The saltmarsh has typical vegetation communities and zonation of vegetation is evident and well-developed in places. A narrow pioneer community is present at several locations with Lax-flowered Sea Lavender colonising on muddy mixed sediment along the edge of the saltmarsh. There are natural transitions to other coastal habitats at both the lower and upper saltmarsh boundaries. This saltmarsh is notable for the presence of complex mosaics with brackish habitats near the head of the Kilcolgan River estuary. The Atlantic salt meadows form part of a larger coastal ecosystem.

A species of local significance, Sea Wormwood, which is found frequently on saltmarshes around Galway Bay, is present at this site. This species has a scattered distribution in Ireland and is only found recently in eight 10 km² squares around the coast of Ireland (Preston *et al.* 2002). Webb *et al.* (1996) described its

distribution as rare and very local although it is not recorded as a rare species in The Red Data Book (Curtis & McGough 1988).

Sea Purslane (*Atriplex portulacoides*) is also present at this site and was recorded at two locations. This is another species of local distinctiveness. This species is mainly distributed along the eastern coast of Ireland and is only found in six 10 km² squares along the west coast. Curtis and Sheehy-Skeffington (1998) have discussed the distribution of this species and hypothesised that its lack of abundance on the west coast compared to the east coast is related to the higher levels of grazing on west coast saltmarshes. The lack of grazing on some of the saltmarshes in Galway Bay may be one of its reasons for its presence on saltmarshes in Galway Bay.

5.2.3 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. The main impact affecting this site is grazing, which is having some negative impact in places, mainly by causing poaching damage. A small reduction in grazing intensity may be beneficial for this site. Most of the saltmarsh habitats are within a cSAC, so the habitat should not be affected by other land-use changes.

A small area of saltmarsh is possibly at risk from the construction of a new seawall and holding pond for shellfish at Tyrone House. The saltmarsh habitat is still present at the time of the survey but if tidal inundation is affected in the future, there is likely to be changes in habitat extent and structure and function. This may affect about 0.7 ha of habitat (about 7% of the total ASM area). About half of this area is situated outside the cSAC boundary.

5.3 Mediterranean salt meadows (H1410)

5.3.1 Extent

The extent of this habitat is assessed as *favourable*. There is only a very small area of this habitat located at this site, although this is quite typical of these small sites. There are no indications of any loss of habitat due to erosion or to land-use changes.

5.3.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Two monitoring stops were carried out in this habitat and one failed. Most of the attributes required for the structure and functions of this habitat reached their targets. The main reason for the failed stop was overgrazing and poaching damage. A significant area of this habitat along the southern side of the Kilcolgan River estuary was not assessed in detail as access was denied to this area. However, a visual assessment indicated that this area was being grazed and there is likely to be some minor poaching. The extent of the damaged habitat is not likely to be greater than 25% meaning the assessment is *unfavourable-inadequate*. The species composition of this habitat was typical of this habitat. Some zonation was noted in the habitat and this was noted from other saltmarsh species. There are also mosaics present with ASM and diverse transitional communities with brackish habitats. The topography was poorly developed, but this is typical of a small patch of habitat. The saltmarsh development is typical of a small estuary.

5.3.4 Future prospects

The future prospects of this habitat are assessed as *unfavourable-inadequate*. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. Overgrazing and poaching is the main activity affecting part of the MSM at this site. There are few other impacts or activities significantly affecting this site. There are few prospects for the loss of habitat due to

erosion in the future. The site is within a cSAC so most of the habitat should not be affected by land-use changes such as development.

6 MANAGEMENT RECOMMENDATIONS

There are no specific management recommendations for the Annex I habitats at this site. This site would benefit from a revising of the cSAC boundary to include the entire Annex I habitat.

7 REFERENCES

Curtis, T.G.F. & McGough, H.N. (1988). *The Irish Red Data Book*. Stationary Office, Dublin.

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.

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


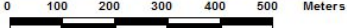

Webb, D.A., Parnell, J. & Doogue, D. (1996). *An Irish flora*. Dundalgan Press, Dundalk.

8 APPENDIX I

Table 8.1. Areas of SMP habitats mapped using GIS.

SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 <i>Salicornia</i> flats						
2	Spartina swards						
3	1330 Atlantic salt meadow	8.771		8.771			
4	1410 Mediterranean salt meadow	8.260			8.260		
5	ASM/MSM mosaic (50/50)	0.297		0.149	0.149		
6	ASM/ <i>Spartina</i> mosaic						
7	1330/other SM (CM2) mosaic	0.733		0.367			
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	39.077					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)						
11	Isolated <i>Spartina</i> clumps on mud (5%)						
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic						
14	<i>Spartina</i> sward dominated, with some ASM						
15	1310/ <i>Spartina</i> mosaic						
16	ASM dominated with some <i>Spartina</i>						
17	1330/sand dune mosaic						
18	Other SM (CM2)	2.898					
19	1330/rocky shore mosaic	1.293		0.647			
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	61.329		9.933	8.409		



	Saltmarsh Monitoring Project 2007-2008	Tyrone House - Dunbulcaun Bay (Map 1 of 2)	SMP code: SMP0091		
		Galway Bay Complex SAC (000268)	<small>This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated sites are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 995)</small>	Date of production: 22/02/2009 Map version: 1	

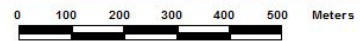


Saltmarsh Monitoring Project 2007-2008

Tyrone House - Dunbulcaun Bay (Map 2 of 2)

Galway Bay Complex SAC (000268)

SMP code: SMP0091



This habitat map was created with a combination of fieldwork, GIS and interpretation of aerial photos. Boundaries of designated sites are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 995)

Date of production: 22/02/2009
Map version: 1

Original Drawing Size: 297 x 420 (A3)
Scale: 1:8500

Appendix X – Kileenaran site report and habitat map from the Saltmarsh Monitoring Project (McCorry & Ryle, 2009)

1 Site Details

SMP site name: Kileenaran	SMP site code: SMP0090
Date of site visit: 15/10/2007	CMP site code: N/A
SM inventory site name: Kileenaran	SM inventory site code: 125
NPWS Site Name: Galway Bay Complex	
NPWS designation <i>cSAC: 000208</i>	MPSU Plan: old format plan available
<i>pNHA: 000208</i>	SPA: 004031
County: Galway	Discovery Map: 52 Grid Ref: 137250, 216300
Aerial photos (2000 series): O 3570-A,C	6 inch Map No: Ga103
Annex I habitats currently listed as qualifying interests for Galway Bay Complex cSAC:	
H1310 <i>Salicornia</i> and other annuals colonizing mud and sand	
H1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	
H1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	
Other SMP sites within this SAC/NHA: Scanlan's Island, Kinavarra West, Tyrone House-Dunbeacon Bay, Kilcaimin, Oranmore North, Roscom West & South, Seaweed Point, Barna,	
Saltmarsh type: Bay	Substrate type: Mud/Sand/Gravel

2 Site description

Kileenaran saltmarsh is located along the eastern side of Galway Bay. This saltmarsh site is one of the several saltmarshes that have developed in the long narrow inlets found on this part of Galway Bay. It is one of 19 Saltmarsh Inventory sites listed in Galway Bay (Curtis & Sheehy-Skeffington 1998). Kileenaran is located 7.3 km south-west of Clarinbridge. The main saltmarsh is located at the head and along the southern side of Brandy Harbour inlet. This inlet is enclosed by a narrow peninsula to the north. The survey site extends from Rincarna Point in the west, to Muckinish Point and Belmuckish Channel to the south of Brandy Harbour. The shoreline topography of the survey site is more complicated in the southern section with several spits or rocky outcrops (and associated saltmarsh) separated by narrow channels. There are also some barrier shingle/cobble bars at the southern side of the survey site and along the northern side of Rincarna Point. Saltmarsh has developed in the leeward side of some of the low-lying areas protected by these shingle/cobble bars. The shoreline topography is also quite intricate due to irregular glacial deposits and rocky outcrops, creating mounds and hollows of various sizes. Saltmarsh is associated with some of the lower hollows that are inundated by the tide creating a mosaic of saltmarsh and dry coastal grassland in places.

This part of Co. Galway is quite rural although there is some ribbon development in places along minor roads in the area and frequent dispersed habitation. The area is relatively low-lying and dominated by agricultural grassland although there are also some patches of semi-natural vegetation, with scrub and dry grassland,

and some limestone pavement. The intertidal areas of Brandy Harbour contain rocky mixed sediment with abundant brown algae cover.

The site is located within the Galway Bay Complex candidate Special Area of Conservation (cSAC 208). Three Annex I habitats are present at this site, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). All these habitats are listed as qualifying interests for the Galway Bay Complex cSAC. Two species of local distinctiveness, Sea Purslane (*Atriplex portulacoides*) and Sea Wormwood (*Seriphidium maritimum*), are found at the site. Most of the saltmarsh habitats mapped at this site is located within the cSAC boundary. There are several fragments of Annex I habitats located outside the boundary around the site. Some are unintentional exclusions, as the 6 inch map was used to draw the cSAC site boundary and there are some errors between this map and the actual ground as indicated from the aerial photos.

The site was accessed via several points along the shoreline. Minor roads pass close to the shoreline along the north side of Rincarna Point. Much of the saltmarsh along the south side of Brandy Harbour is within commonage and permission was sought to enter this area, which was grazed by both sheep and cattle.

3 Saltmarsh Habitats

3.1 General description

The main Annex I saltmarsh habitat found on this site is Atlantic salt meadow (ASM) (Table 3.1). This habitat is distributed around the entire site and is found in several different situations, increasing the diversity of the site. The main area of habitat is distributed along the south side of Brandy Harbour and continues south to Muckanish. The ASM has a complex topography due to underlying glacial deposits that has created frequent mounds and hollows of various sizes and shapes. The saltmarsh has developed in the lower lying sections inundated by the tide and therefore has an intricate upper boundary. There is also frequent scattered rock on parts of the saltmarsh. The ASM transitions to dry coastal grassland (GS1) and the upper boundary of the saltmarsh was sometimes difficult to identify where there were shallow slopes from one habitat to the other. The presence of Sea Wormwood is a positive indicator. Other transitional species include Silverweed (*Potentilla anserina*), Daisy (*Bellis perennis*), Mouse-eared Chickweed (*Cerastium fontanum*) and White Clover (*Trifolium repens*).

There are occasional small mounds containing dry coastal grassland and exposed rock that area surrounded by saltmarsh. There are several old dry stone walls marking different enclosures that cross the saltmarsh. Some of the saltmarsh also has dry stone walls along the lower seaward boundary to protect sheep and cattle from staying into the adjacent intertidal area.

Further south towards Muckanish there is some exposed limestone pavement on the shoreline. There presence of this habitat has created an unusual saltmarsh variant. Saltmarsh plants grow in the grikes of the limestone pavement.

There are several areas where there are narrow bands of saltmarsh. A narrow band of ASM is also present along the north side of Brandy Harbour. The ASM has developed on a thin band of sediment over-lying cobble beach. The saltmarsh transitions to upper saltmarsh dominated by Twitch (*Elytrigia repens*). These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. The saltmarsh has eroded away in places leaving only small patches in association with the storm beach and the vegetation is more typical of stony banks. Saltmarsh habitats develop into isolated patches of vegetation and isolated plants vegetating cobble beach shoreline.

Saltmarsh was also mapped along the north side of the Rincarna Peninsula. This side of the peninsula is more exposed and a storm beach or shingle/cobble bar has developed along the shoreline. This cobble bar has cut off or sheltered several low-lying hollows that contain intertidal pools and/or lagoons. The pools contain bare intertidal sediment and scattered cobble. Narrow bands of saltmarsh vegetation have

developed on steep-sided slopes around these pools. There are transitions from saltmarsh to elements of vegetation of stony banks on these cobble bars. This type of habitat is also found at the southern side of the survey site at Muckanish.

Mediterranean salt meadows are found at one location on the site, at the head of Brandy Harbour. There are natural transitions between the surrounding ASM and the MSM. Only a small area of *Salicornia* flats is present at this site and is located at the southern end of the site.

The main intertidal habitats found adjacent to the saltmarsh are exposed rock, coarse pebble and cobble deposits and muddy mixed sediment. There are some patches of intertidal mud also present. There is abundant brown algae associated with the exposed rock.

Table 3.1. Area of saltmarsh habitats mapped at Kileenaran.

EU Code	Habitat	Area (ha)
1310	<i>Salicornia</i> and other annuals colonizing mud and sand	0.008
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>)	15.166
1410	Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	0.271
	Total*	15.445

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

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

This habitat is found at several locations across the site, but its overall extent is quite small. It is found in some of the pools sheltered by the cobble ridge along the northern side of Rincarna Point. These patches are dominated by Glasswort (*Salicornia* sp.). Annual Sea-blite (*Suaeda maritima*) also vegetates narrow bands of cobble on shingle/cobble bars around the small lagoons/pools. These patches of habitat are not classified as 1310 because the substrate is not mud or sand and it has more affinity to vegetation of stony bank.

Glasswort has also colonised small patches of mixed sediment at the southern end of the survey area, in some sheltered situations.

3.3 Atlantic salt meadows (H1330)

The vegetation of this habitat is quite typical and similar to other saltmarsh sites around Galway Bay, particularly Tawin Island. Both these sites contain saltmarsh whose topography is significantly impacted by underlying glacial deposits. Several typical saltmarsh communities are present at this site. Zonation of the saltmarsh vegetation is also evident and the different communities are best developed in the largest saltmarsh areas located along the southern side of Brandy Harbour. The moderate levels of grazing has created a low close-cropped sward and miniaturized saltmarsh plants compared to other ungrazed sites.

The saltmarsh is mainly dominated by mid-upper saltmarsh vegetation. There are only several locations where a lower saltmarsh community dominated by Common Saltmarsh-grass (*Puccinellia maritima*) is well developed on soft mud, although this community may be found along the lower saltmarsh boundary. This vegetation type also contains occasionally frequent Lax-flowered Sea Lavender (*Limonium humile*) and also some Sea Pink (*Armeria maritima*), Common Scurvygrass (*Cochlearia officinalis*), Annual Sea-blite, Sea Aster (*Aster tripolium*) and Glasswort. This vegetation community was poached in places.

A typical mid-marsh community dominated by Sea Pink and Sea Plantain (*Plantago maritima*) is not extensive but is present along the zonation along some slopes. This community is usually dominated by a mixture of Common Saltmarsh-grass and one or both of the species listed above.

The mid-upper saltmarsh is dominated by Red Fescue (*Festuca rubra*). There are usually small amounts of Sea Plantain and Sea Pink in this vegetation type. Species such as Buck's-horn Plantain (*Plantago coronopus*), Sea Milkwort (*Glaux maritima*), Autumn Hawkbit (*Leontodon autumnalis*), Lesser Sea Spurrey (*Spergularia media*) and Spear-leaved Orache (*Atriplex prostrata*) appear towards the upper boundary. Buck's-horn Plantain may become frequent. Other species present include Frosted Orache (*Atriplex lacinata*). Turf fucoids (an indicator of local distinctiveness) were also noted at this site and area associated with the mid-marsh zones. Saltmarsh Rush (*Juncus gerardii*) is present at several locations in the mid-upper saltmarsh, but is not frequent in cover.

The saltmarsh topography is well-developed with creeks and salt pans present. The underlying glacial deposits have also created a complex topography of mounds and hollows. This means there is a wide assortment of slopes and zonation. Some of the creeks and channels that drain the saltmarsh relate to the underlying topography of the glacial deposits and limestone bedrock. The limestone bedrock is sometimes exposed and loose limestone rock is also frequent in places. The ASM may form mosaics with rocky shore at some locations.

Narrow strips of ASM habitat are also found around small pools/lagoons along the north side of Rincarna Point. The habitat is situated on a steep slope and there is a transition from Common Saltmarsh-grass-dominated vegetation to Red Fescue-dominated vegetation. Other species present in the saltmarsh vegetation include Sea Plantain, Sea Pink, Annual Sea-blite, Common Scurvygrass, Lax-flowered Sea Lavender, Sea Arrowgrass (*Triglochin maritimum*) and Creeping Bentgrass (*Agrostis stolonifera*). There is a further transition upward to dry coastal grassland along the top of the cobble banks. Species such as Sea Beet (*Beta maritima*) and Spear-leaved Orache are found along the upper saltmarsh boundary. Sea Wormwood is also present in the upper saltmarsh and growing the scattered vegetation over the barer stony banks. Some of the grassland along the upper boundary is typical of CM2 upper saltmarsh and is dominated by Twitch (*Elytrigia repens*). There is generally no saltmarsh topography associated with these strips of saltmarsh habitat.

Sea Wormwood and Sea Purslane are also found in some of the narrow strips of saltmarsh vegetation located along the north side of Brandy Harbour.

Moderate levels of grazing have created a closely cropped sward but have not affected diversity of the saltmarsh habitat. The sward height is quite uniform in places. However, patches with Sea Wormwood are not grazed so intensively. Grazing does seem to affect the distribution of Sea Purslane. This species is found along the northern side of Brandy Harbour, which is not grazed significantly. No Sea Purslane was found along the southern side of Brandy Harbour, which is grazed. Some Sea Purslane was found in the limestone pavement area in some of the grikes, where it may be protected from grazing animals.

3.4 Mediterranean salt meadows (H1410)

This habitat is found at one location on the site near the head of the Brandy Harbour in the north-east part of the site. The habitat structure is dominated by tall tussocks of Sea Rush (20-40% cover). Red Fescue is abundant and other species include Saltmarsh Rush, Sea Mayweed (*Tripleurospermum maritimum*), Creeping Bentgrass, Autumn Hawkbit, White Clover, Spear-leaved Orache, Mouse-eared Chickweed (*Cerastium fontanum*) Birdsfoot Trefoil (*Lotus corniculatus*), Sea Plantain, Sea Arrowgrass and Common Scurvygrass.

Zonation of vegetation within the MSM is evident and is related to a slight slope. The lower area contains MSM with dense Sea Rush and the upper parts where transitional species like Mouse-eared Chickweed and Birdsfoot appear. This habitat is not grazed as intensively as the ASM. There is a distinct boundary between the MSM area and the adjacent ASM which is unusual. Sea Rush is not even found as isolated tussocks in the ASM. There are some pans in this area but no significant creeks. The distribution of the MSM may be related to a small drain/stream that flows past this section and into the head of Brandy Harbour.

4 Impacts and Activities

Several impacts and activities affect this site, but most generally have low or neutral intensities (Table 4.1). Most of the site along the southern side of Brandy Harbour is grazed by sheep and cattle and this has created a typical closely cropped sward 1-3 cm high over much of the saltmarsh. However grazing is at a moderate level on most of the habitat and there are few signs of damage from this grazing (142) such as heavy poaching, removal of vegetation cover and impacts on diversity. It should be noted that the height of the vegetation is somewhat taller in the coastal grassland compared to the saltmarsh, indicating livestock preference for saltmarsh.

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

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1310	140	C	0	0.008	Inside
1330	140	B	0	10.166	Inside
1330	142	B	-1	5.000	Inside
1330	501	C	-1	0.100	Inside
1330	900	C	0	0.7	Inside
1410	140	C	0	0.271	Inside

¹ EU codes as per Interpretation Manual.

² Description of activity codes are found in Appendix III, Summary Report 2007-2008.

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

⁴ Impact is rated as -2 = irreparable negative influence, -1 = 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 saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

There are sections (generally the lower saltmarsh) that are poached and damaged but these only cover a minor percentage of the overall saltmarsh habitat area. There are signs of poaching-induced erosion along the lower saltmarsh boundary at various locations but this is also minor (142). However, erosion is also induced due to the relatively thin nature of some of the sediment over glacial deposits that carry the saltmarsh habitat, which are more easily eroded by overgrazing. The north side of Brandy Harbour is not grazed.

The inlet north of Rincarna Point is used for shellfish aquaculture but this does not affect the saltmarsh in Brandy Harbour. There are several tracks that cross the saltmarsh that have eroded minor areas of saltmarsh (501). There are several other tracks along various parts of the shoreline that are used for shoreline access and access for farm vehicles to commonage areas. These tracks also occasionally cross saltmarsh but the impacts are very minor. There are also several tracks across the commonage area that have been created by livestock using the area (501). There are several spots with some very minor damage due to poaching and/or removal of vegetation cover.

Erosion (900) at the site is not significant. A comparison of the OSI 2nd edition 6 inch map to the OSI 2000 series aerial photos shows that there have been no significant losses of saltmarsh and no measurable erosion in the past 100 years. There have been some small changes with losses and gains mainly due to shifts in the shingle/cobble bars, but these largely compensate each other. There are also signs of erosion along the seaward boundary of the saltmarsh, but there was no measurable erosion of saltmarsh during the current monitoring period. The impact of erosion is assessed as neutral on a small portion of saltmarsh.

Old dry stone walls are occasionally found along some of the lower saltmarsh boundary at several locations. This may be related to some old coastal protection works. There are other dry stone walls along or close to the lower saltmarsh boundary that were constructed to enclose the saltmarsh and protect grazing animals from adjacent rocky intertidal areas.

Impacts and activities adjacent to the site include dispersed habitation (403), fishing/aquaculture (200) and fertilization (120) and the grazing of livestock (140) related to farming practises.

5 Conservation status

5.1 Overall Conservation Status

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

The overall conservation status of this site is assessed as *unfavourable-inadequate* (Table 5.1). Kileenaran is a moderately-sized saltmarsh with several features of interest, such as an unusually complex topography affected by the underlying glacial deposits, the presence of limestone pavement colonised by some saltmarsh along the shoreline and the presence of several species of local distinctiveness. Four monitoring stops out of a total of seventeen monitoring stops failed but this probably over-emphasises the inadequate conservation status of this site. Much of the saltmarsh is located within commonage and this is grazed with a moderate intensity by sheep and cattle. Grazing has created a typical low close-cropped sward typical of these commonage areas grazed by sheep. Erosion at this site is not significant.

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

Habitat	EU Conservation Status Assessment			Overall EU conservation status assessment
	Favourable	Unfavourable - Inadequate	Unfavourable - Bad	
<i>Salicornia</i> 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

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are moderate-good. There is considerable scope for landward transition of saltmarsh vegetation up slope into dry costal grassland. The irregular topography of much of the marsh has created a complex mosaic of coastal grassland and saltmarsh. However, these are very general predictions.

This site is located within the Galway Bay Complex cSAC although not all the saltmarsh habitat is located within the cSAC boundary. This site is located within the Galway Bay Complex cSAC. An old format NPWS management plan is available for the saltmarsh habitats at this cSAC but it is now old of date.

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

5.2.1 Extent

The extent of this habitat is assessed as *favourable*. There is only a very small area of this habitat located at this site, although this is quite typical of these small sites. There are no indications of any loss of habitat due to erosion or to land-use changes. There are no indications of any loss of habitat due to erosion or to land-use changes.

5.2.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. No monitoring stops were carried out in this habitat due to the small extent present at the site. However, a visual assessment of the habitat indicated that it would probably pass for all attributes. Several ecotypes were present with this habitat appearing along the seaward boundary of the saltmarsh on mixed sediment and in some of the small pools/lagoons created by the storm beach/cobble ridge.

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 few impacts or activities affecting this habitat at this site, although a very small extent is present. This makes it vulnerable to small changes at the site. The habitat extent is likely to remain small at this site as there are no suitable extensive intertidal mud and sandflats for this habitat.

5.3 Atlantic salt meadows (H1330)

5.3.1 Extent

The extent of this habitat is assessed as *favourable*. There are no indications of any loss of habitat due to erosion or to land-use changes within the current monitoring period. There are indications of localised erosion along the seaward boundary but there has been no measurable loss of saltmarsh within the current monitoring period.

5.3.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Sixteen monitoring stops were carried out in this habitat and four failed (25%). Most of the attributes required for the structure and functions of this habitat reached their targets. Moderate grazing intensities has created a typical close-cropped sward but diversity is not impacted. Several stops failed due to poaching damage and heavy grazing. Grazing has created a close-cropped low sward and the structural sward height is quite uniform. There are also signs of poaching-induced erosion along the seaward boundary of the saltmarsh.

However, the saltmarsh is generally in good condition. The saltmarsh has typical vegetation communities and zonation of vegetation is evident and well-developed in places. The saltmarsh topography is well developed in places. There are natural transitions to other coastal habitats at both the lower and upper saltmarsh boundaries. The Atlantic salt meadows form part of a larger coastal ecosystem.

A species of local significance, Sea Wormwood, which is found frequently on saltmarshes around Galway Bay, is present at this site. This species has a scattered distribution in Ireland and is only found recently in eight 10 km² squares around the coast of Ireland (Preston *et al.* 2002). Webb *et al.* (1996) described its distribution as rare and very local although it is not recorded as a rare species in The Red Data Book (Curtis & McGough 1988).

Sea Purslane (*Atriplex portulacoides*) is also present at this site and was recorded at two locations. This is another species of local distinctiveness. This species is mainly distributed along the eastern coast of Ireland and is only found in six 10 km² squares along the west coast. Curtis and Sheehy-Skeffington (1998) have discussed the distribution of this species and hypothesised that its lack of abundance on the west coast compared to the east coast is related to the higher levels of grazing on west coast saltmarshes. The lack of grazing on some of the saltmarshes in Galway Bay may be one of its reasons for its presence on saltmarshes in Galway Bay.

Turf fucoids were also noted on the site. This is another indicator of local distinctiveness and is generally associated with saltmarshes along the west coast of Ireland.

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. The main impact affecting this site is grazing, which is having some localised negative impact in places. A small reduction in grazing intensity may be beneficial for this site. Most of the saltmarsh habitats are within a cSAC, so the habitat should not be affected by other land-use changes.

5.4 Mediterranean salt meadows (H1410)

5.4.1 Extent

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

5.4.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. One monitoring stop was carried out in this habitat and it passed. All of the attributes required for the structure and functions of this habitat reached their targets. The habitat displays some zonation of vegetation, with transitional terrestrial species such as Mouse-ear Chickweed appearing in the habitat. There are some small pans present in the habitat but the saltmarsh topography is not well developed. The habitat is generally in good condition and grazing intensity is not as high compared to the ASM.

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. There are few impacts or activities affecting this habitat at this site, although a small extent is present. This habitat is located within the cSAC boundary and is therefore protected by nature conservation designation.

6 Management Recommendations

There are no specific management recommendations for the Annex I habitats at this site.

7 References

Curtis, T.G.F. & McGough, H.N. (1988). *The Irish Red Data Book*. Stationary Office, Dublin.

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.

Natura (2006). *Galway City habitat inventory*. A report for Galway City Development Board. Galway County Council.

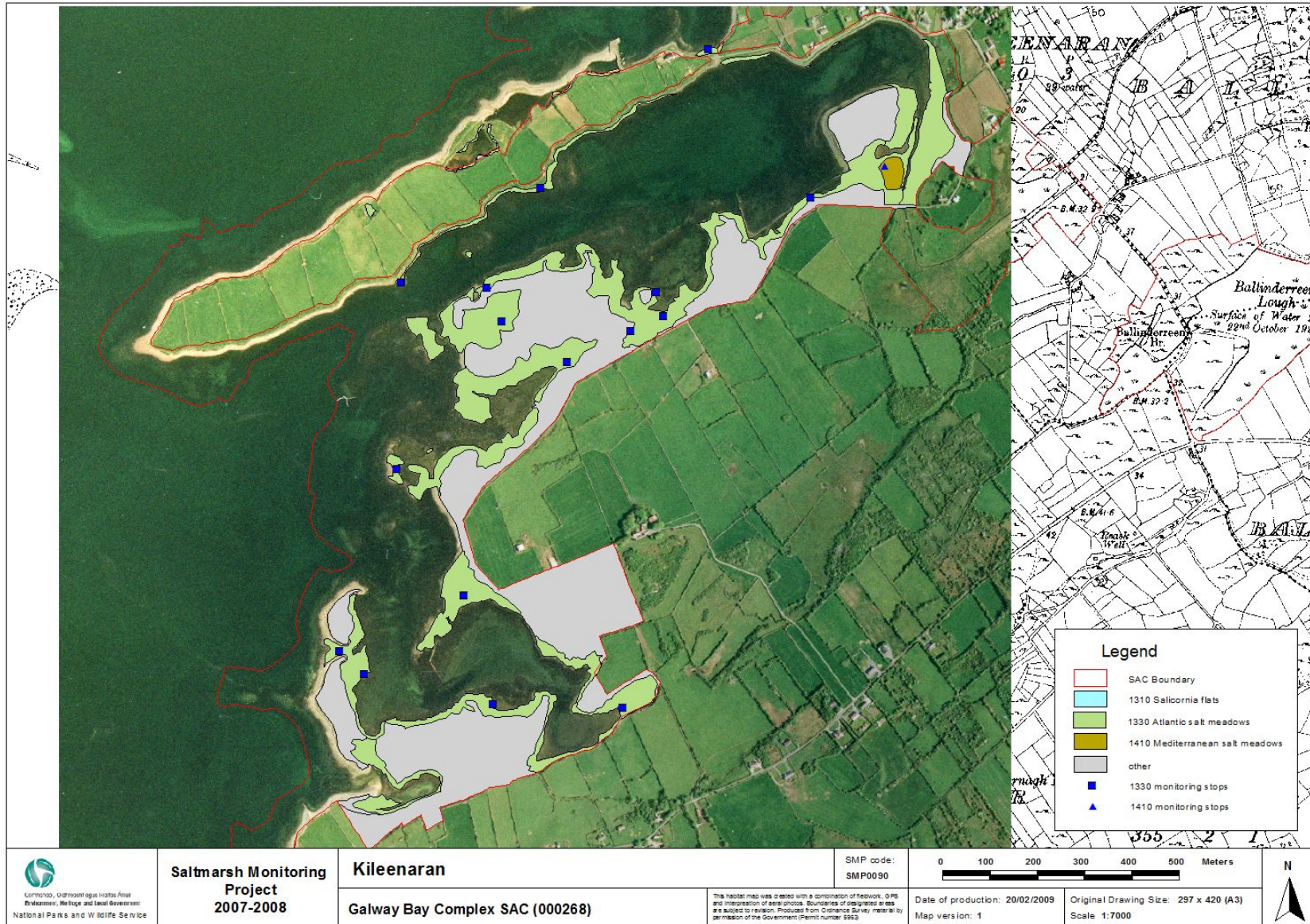
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8 Appendix I

Table 8.1. Areas of SMP habitats mapped using GIS.

SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 <i>Salicornia</i> flats	0.008	0.008				
2	Spartina swards						
3	1330 Atlantic salt meadow	15.166		15.166			
4	1410 Mediterranean salt meadow	0.271			0.271		
5	ASM/MSM mosaic (50/50)						
6	ASM/ <i>Spartina</i> mosaic						
7	1330/other SM (CM2) mosaic						
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	22.984					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)						
11	Isolated <i>Spartina</i> clumps on mud (5%)						
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic						
14	<i>Spartina</i> sward dominated, with some ASM						
15	1310/ <i>Spartina</i> mosaic						
16	ASM dominated with some <i>Spartina</i>						
17	1330/sand dune mosaic						
18	Other SM (CM2)						
19	1330/rocky shore mosaic						
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	38.429	0.008	15.166	0.271		




 Department of the Environment,
 Heritage and Local Government
 National Parks and Wildlife Service

**Saltmarsh Monitoring
 Project
 2007-2008**

Kileenaran
Galway Bay Complex SAC (000268)

SMP code:
 SMP0090

0 100 200 300 400 500 Meters
 Date of production: 20/02/2009
 Map version: 1
 Original Drawing Size: 297 x 420 (A3)
 Scale: 1:7000



Appendix XI – Kinvarra West site report and habitat map from the Saltmarsh Monitoring Project (McCorry, 2007)

1 Site Details

SMP site name: Kinvara West	SMP site code: SMP0089
Dates of site visit 16 & 17/10/2007	CMP site code: N/A
SM inventory site name: Kinvara West	SM inventory site code: 128
NPWS Site Name: Galway Bay Complex	
NPWS designation <i>cSAC: 000208</i>	MPSU Plan: old format plan available
<i>pNHA: 000208</i>	SPA: 004031
County: Galway	Discovery Map: 52 Grid Ref: 134825, 213000
Aerial photos (2000 series): O 3625-A,B,C,D	6 inch Map No: Ga112, Ga113
Annex I habitats currently listed as qualifying interests for Galway Bay Complex <i>cSAC</i> :	
H1310 <i>Salicornia</i> and other annuals colonizing mud and sand	
H1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	
H1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>)	
Other SMP sites within this SAC/NHA: Scanlan’s Island, Kileenaran, Tyrone House-Dunbeacon Bay, Kilcaimin, Oranmore North, Roscom West & South, Seaweed Point, Barna,	
Saltmarsh type: Bay	Substrate type: Mud/Sand

2 Site description

Kinvara West is located along the south-east corner of Galway Bay in Co. Galway. It is one of 19 Saltmarsh Inventory sites listed in Galway Bay (Curtis & Sheehy-Skeffington 1998). The saltmarsh is one of two inventory sites located in Kinvara Bay with the other site being Kinvara South (inventory site code 127). Kinvara West is located 3.8 km north-west of Kinvara Town.

Kinvara Bay is a shallow bay with an irregular complex shoreline and a narrow neck at Doorus Point. Saltmarsh is distributed around most of the shoreline in sheltered areas and is associated with coastal grassland mosaics and with rocky intertidal areas. There is a secondary inlet along the western side of the bay. This area was surveyed as the Kinvara West survey site. This part of the bay is quite shallow and contains frequent islands of various sizes, from small rocky outcrops to islands containing scrub and coastal grassland. Many of these small islands also have saltmarsh around their shorelines. The intertidal areas of Kinvara West contain rocky mixed sediment with abundant brown algae cover. The bay and shoreline is quite isolated and some Seal were recorded in the Seal island area. Many of the islands are used by roosting birds.

A minor road accessing Doorus Point and Parkmore Quay passes over the western boundary of the site and has cut off or isolated part of the bay (Bridge Lough) from the main intertidal area. This western section is still influenced by the tide via culverts under the road and there is some minor saltmarsh development along the shoreline. However, tidal fluctuations have a reduced amplitude and the western side of this area contains brackish habitats. Bridge Lough is further divided on the western side by another minor road and this extends into Lough Adoona, which is dominated by freshwater habitats.

This part of Co. Galway is quite rural although there is some ribbon development in places along minor roads in the area and frequent dispersed habitation. The area is relatively low-lying and dominated by agricultural

grassland although there are also some patches of semi-natural vegetation, with scrub and dry grassland related to rocky outcrops and some limestone pavement.

The site is located within the Galway Bay Complex candidate Special Area of Conservation (cSAC 208). Two Annex I habitats are present at this site, *Salicornia* flats and Atlantic salt meadows (ASM)). Both of these habitats are listed as qualifying interests for the Galway Bay Complex cSAC. Two species of local distinctiveness, Sea Purslane (*Atriplex portulacoides*) and Sea Wormwood (*Seriphidium maritimum*), are found at the site. Most of the saltmarsh habitats mapped at this site is located within the cSAC boundary. There are minor amounts of Annex I habitats located outside the boundary around the site. Most are unintentional exclusions, as the 6 inch map was used to draw the cSAC site boundary and there are some errors between this map and the actual ground as indicated from the aerial photos. Sometimes the wrong (lower) shoreline boundary was used to draw the cSAC boundary and this excluded minor amounts of saltmarsh habitat.

This site was accessed via several points around the bay including Parkmore Quay, the minor road crossing the western side of the bay and where minor roads access some old quays at Doorus Demesne along the southern side of the site. Many of the small islands close to the shoreline could be accessed at low tide by crossing the intertidal zone.

3 Saltmarsh Habitats

3.1 General description

The main saltmarsh habitat found at this site is Atlantic salt meadows (ASM) (Table 3.1). This habitat is distributed around most of the surveyed area. There are minor amounts of *Salicornia* flats at the site and these small patches are mainly associated with seaward boundary of the saltmarsh and other shoreline on mixed sediment.

The ASM is mainly found in irregular larger low-lying fragments along the shoreline connected by narrower strips of saltmarsh. The shoreline is quite intricate and complex and this has influenced the topography of the saltmarsh, with both the upper and lower boundaries having complex outlines. Most of the saltmarsh habitat is separated from the adjacent terrestrial land by old field boundaries marking the landward boundary of the saltmarsh, but occasionally the saltmarsh is enclosed within the field boundaries that are usually dry stone walls. These dry stone walls also occasionally cross the saltmarsh and enclose intertidal areas. These old walls have not been maintained and have been reduced to lines of rocks across the saltmarsh.

The saltmarsh topography is also affected by the underlying glacial and bed rock topography that has created frequent small mounds and hollows of various sizes and shapes. The topography is also affected by the depth of sediment that has been deposited. The limestone bed rock is exposed on the saltmarsh in places and there is also frequent loose exposed rock in places. The saltmarsh forms mosaics with mounds and banks containing dry coastal grassland and with upper saltmarsh grassland dominated by Twitch (*Elytrigia repens*). These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. The upper saltmarsh grassland also contains Sea Mayweed (*Tripleurospermum maritimum*), Curled Dock (*Rumex crispus*), Spear-leaved Orache (*Atriplex prostrata*), Frosted Orache (*Atriplex lacinata*), Bramble (*Rubus fruticosus*) and Silverweed (*Potentilla anserina*). Occasionally the saltmarsh transitions directly to scrub and hedgerow in places. Doorus Demesne is not managed and scrub has covered a significant part of this area, as it is not grazed significantly. There are also patches of orchid-rich dry grassland (GS1) in close proximity to the shoreline and the saltmarsh habitats.

Atlantic salt meadows are also found on many of the small islands located within this part of Kinvara Bay. This part of the bay is quite shallow that there are some old tracked cleared in the intertidal zone for livestock to access these islands. Some of the islands are quite small and only contain patches of saltmarsh in

mosaic with rocky shore. Some of the islands are larger and contain scrub and dry coastal grassland in the terrestrial sections.

There are also several parts of the survey site that are more exposed and contain narrow ribbons of saltmarsh habitat on thin bands of sediment that develop into isolated patches of vegetation and isolated plants vegetating more dominant cobble storm beach along the outer shore, such as close to Parkmore Quay. These narrow ribbons of saltmarsh are frequently covered by brown algae. Some of the saltmarsh is mapped as a mosaic of ASM and rocky shore. A rocky mosaic is found around some of the small islands with steep-sided shorelines.

Some brackish habitats containing Common Reed (*Phragmites australis*) and Sea Club-rush (*Bolboschoenus maritimus*) are located at the western side of Bridge Lough. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. This small lough is somewhat like a lagoon and has a reduced tidal influence, although it is still saline. This area was not surveyed due to access problems.

The main intertidal habitats found adjacent to the saltmarsh are exposed rock and coarse pebble and cobble deposits. There are minor areas of muddy mixed sediment. There is abundant brown algae associated with the rocky shoreline.

Table 3.1. Area of saltmarsh habitats mapped at Kinvara West.

EU Code	Habitat	Area (ha)
1310	<i>Salicornia</i> and other annuals colonizing mud and sand	0.018
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritima</i>)	13.295
	Total	13.313

note that saltmarsh habitat continue outside the mapped area in Kinvara Bay.

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

This habitat is found at several locations around the site but its extent is quite minor in relation to the ASM. The largest patch is a strip about 1 m wide that has developed on mixed sediment along side a fairly new seawall. A second patch appears as a 0.5 m wide strip of Glasswort (*Salicornia* sp.) that is located in a small sheltered inlet along the edge of the saltmarsh. The Glasswort has developed on bare mud along the seaward edge of the saltmarsh.

There are also several small patches of this habitat on the saltmarsh where brown algae has induced 1310 formation in places. The brown algae covered the ASM and forms bare mud patches where vegetation has rotted and died back. Pioneer ASM has also developed by this process.

3.3 Atlantic salt meadows (H1330)

The vegetation of this habitat is quite typical and similar to other saltmarsh sites around Galway Bay, particularly Tawin Island and Kileenaran. Both these sites contain saltmarsh whose topography is significantly impacted by underlying glacial deposits and bedrock, created an intricate and complex shoreline. Several typical saltmarsh communities are present at this site. Zonation of the saltmarsh vegetation is also evident and the different communities are best developed in the largest saltmarsh areas located along the southern side of the survey site. This area also displays internal zonation related to channels and mounds within the saltmarsh. However, in contrast to Kileenaran, grazing is mainly by cattle so poaching is more frequent. Close-cropped swards are also less prevalent. The sward height varies and

some sections contain tall rank Red Fescue-dominated grassland 10-20 cm high. The sward height of grazed areas varies between 2-5 cm high.

Several typical saltmarsh communities are present at this site. The lower saltmarsh is dominated by Saltmarsh Grass (*Puccinellia maritima*) and this community is frequently heavily poached in places. This community also contains occasional Sea Aster (*Aster tripolium*), Sea Plantain (*Plantago maritima*), Lax-flowered Sea Lavender (*Limonium humile*), Common Scurvygrass (*Cochlearia officinalis*), and rare Sea Milkwort (*Glaux maritima*) and Sea-spurrey (*Spergularia media*). Some of the narrow bands of saltmarsh that contain this community also contain small pans contain cobbles. Glasswort and Annual Sea-blite (*Suaeda maritima*) are occasionally found in this community near the seaward boundary. Both *Salicornia europaea* and *Salicornia decumbens* are present. Higher up in this zone (low-mid) Sea Plantain is more frequent. This zone is also found along some of the narrow creeks and channels that drain the larger sections of saltmarsh and extend further landward.

Sea Purslane is also occasionally frequent in the lower saltmarsh zone on some of the more isolated islands where there is no or low grazing levels. It is situated along some of the minor creeks and along the drier saltmarsh cliff on the island.

A pioneer saltmarsh community is also present on the site and is located in the southern side of the site. A minor road crosses a low-lying area of the shoreline and there is saltmarsh on both sides of the road. The saltmarsh on the landward side surrounds a bare exposed area containing mud. This area contains some pioneer saltmarsh dominated by bare mud with Great Sea-spurrey, Glasswort, Annual Sea-blite, Common Saltmarsh-grass, Spear-leaved Orache and Frosted Orache. The development of this community is related to poaching damage and re-vegetation.

A mid marsh vegetation community dominated by Sea Plantain is also present, although not a prevalent as the lower and mid upper communities. This community is best developed along the southern side of the site, near the Doorus Demesne. Other species present include frequent Common Saltmarsh-grass and rare or occasional Glasswort, Annual Sea-blite, Sea Arrowgrass (*Triglochin maritimum*), Sea Aster and Red Fescue (*Festuca rubra*). Sea Pink (*Armeria maritima*) is present but is not as frequent compared to other sites. A typical low close-cropped sward has developed in this community.

A mid-upper saltmarsh zone is dominated by Red Fescue. Other species occasionally or frequently present include Sea Plantain, Saltmarsh Rush (*Juncus gerardii*), Autumn Hawkbit (*Leontodon autumnalis*), Buck's-horn Plantain (*Plantago coronopus*), Creeping Bentgrass (*Agrostis stolonifera*) and White Clover (*Trifolium repens*). Curled Dock is rare. A similar community with co-dominance of Saltmarsh Rush and Red Fescue is present but rare. This community is frequently found on small mounds.

The boundary between the saltmarsh and adjacent coastal grassland is sometimes difficult to distinguish as both communities are dominated by Red Fescue. However, the boundary is usually easier to define along steeper sided mounds, banks and ridges by the presence of other terrestrial species such as Ladies Bedstraw (*Galium verum*), Mouse-ear Chickweed (*Cerastium fontanum*), *Rhytidadelphus loreus*, and Red Clover (*Trifolium pratense*). Sea Wormwood also grows occasionally along the upper saltmarsh boundary. Other species present include occasional Sea Beet (*Beta maritima*), Frosted Orache and Sea Mayweed.

The lower saltmarsh boundary is quite variable. The main habitat in the transitional zone is rocky shoreline. Some thin bands of ASM transition directly to cobbly shoreline and the saltmarsh boundary is only 0.05-0.1 m high. Higher saltmarsh cliffs have developed along some of the more sheltered sections (allowing more mud to build up) and these are up to 0.5 m high. There are some physical signs of erosion along these saltmarsh cliffs with tussocks and mud balls appearing. Some of the thin bands of saltmarsh are also eroded in places, but this may be influenced by poaching and vehicle use of the shoreline. There are also signs of erosion along the north-west side of Seal Island.

The general creek and pan topography of the saltmarsh is poorly developed due to the small size of saltmarsh fragments and generally narrow nature of the intertidal zone. Some creeks and pans have

developed in association with typical mid-marsh vegetation at the southern side of the site and the creeks are also probably related to the under-lying glacial and bedrock topography. Some of the creeks are filled with loose rock.

Some sheltered sections of rocky shoreline collect abundant broad algae that lie over the saltmarsh. These areas are rich in organic material and are being colonised by Spear-leaved Orache and Sea Beet.

4 Impacts and Activities

Few impacts and activities affect this site and much of the shoreline is quite isolated (Table 4.1). The main impact is grazing (140 & 143). The grazing intensity varies over the site as the site covers several different land holdings, and this also affects the vegetation assemblages. There was no grazing at 9 monitoring stops, light grazing at 7 stops and moderate levels of grazing at 7 monitoring stops. Cattle mainly graze the northern and south-western parts of this site and there are frequent signs of poaching, particularly in the lower saltmarsh zones. The south western section is also grazed, but the intensity is much lower. There were signs of previously higher levels of grazing with old poaching damage. Sea Purslane is more frequently found on ungrazed more isolated islands and along some of the rockier parts of the shoreline, which are more inaccessible to cattle.

Table 4.1. Intensity of various activities on saltmarsh habitats at Kinvara West.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1310	140	C	0	0.018	Inside
1310	871	C	+1	0.018	Inside
1330	140	B	0	9.295	Inside
1330	143	B	-1	4.000	Inside
1330	501	C	-1	0.25	Inside
1330	900	C	0	0.6	Inside

¹ EU codes as per Interpretation Manual.

² Description of activity codes are found in Appendix III, Summary Report 2007-2008.

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

⁴ Impact is rated as -2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1= natural positive influence and +2 = strongly managed positive influence.

⁵ Location of activity: Inside = activities recorded within and directly impacting the saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

There are several tracks that cross the saltmarsh in places (501). The upper shoreline (and saltmarsh zone) is also used as a track at one location and this has eroded the saltmarsh found in this zone somewhat. There are also wheel ruts in some areas where vehicles are accessing adjacent pastures via the shoreline (ASM).

There have also been some recent modifications along the shoreline at several locations. Some saltmarsh around small lagoon/pool containing bare mud has been recently enclosed by large limestone boulders creating a dry stone wall to enclose livestock. A relatively new seawall (871) has been built along the shoreline at one location to protect a lane accessing several properties. The development of *Salicornia* flats along adjacent shoreline may be related to infilling and the construction of this seawall.

Erosion (900) at the site is not significant. A comparison of the OSI 2nd edition 6 inch map to the OSI 2000 series aerial photos shows that there have been no significant losses of saltmarsh and no measurable erosion in the past 100 years. There are also signs of erosion along the seaward boundary of the saltmarsh,

but there was no measurable erosion of saltmarsh during the current monitoring period. Erosion is assessed as having a neutral impact on a small portion of the saltmarsh.

There are frequent signs of older use of the saltmarsh and shoreline area with frequent old dry stone walls crossing various sections of the saltmarsh and intertidal zone. Several paths have also been cleared across dense boulder beds in the intertidal zone to access some of the islands. Some old stone walls are located along the seaward edge of the saltmarsh at various locations including some of the islands. These impacts are not assessed as they occurred outside the current monitoring period.

Impacts and activities adjacent to the site include dispersed habitation (403), fishing/aquaculture in Kinvara Bay (200) and fertilization (120) and the grazing of livestock (140) related to farming practises.

5 Conservation status

5.1 Overall Conservation Status

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

Table 5.1. Conservation status of Annex I saltmarsh habitats at Kinvara West.

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

The overall conservation status of this site is assessed as *unfavourable-bad* (Table 5.1). Kinvara West is a saltmarsh site of moderate size with several features of interest, such as the presence of several species of local distinctiveness. The saltmarsh has a complex and intricate topography around the shoreline due to the under-laying bedrock and forms complex mosaics at some locations with dry coastal grassland. There have been few modifications along the upper and lower saltmarsh boundaries meaning there are natural transitions to terrestrial habitats and intertidal habitats. Cattle grazing has negatively affected the conservation status of this site and there is significant poaching damage of the lower saltmarsh boundary. Erosion at this site is not significant.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are moderate-good. There is considerable scope for landward transition of saltmarsh vegetation up slope into dry coastal grassland. The irregular topography of much of the marsh has created a complex mosaic of coastal grassland and saltmarsh. However, these are very general predictions.

This site is located within the Galway Bay Complex cSAC. An old format NPWS management plan is available for the saltmarsh habitats at this cSAC but it is now out of date.

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

5.2.1 Extent

The extent of this habitat is assessed as *favourable*. There is only a very small area of this habitat located at this site, although this is quite typical of these small sites. There are no indications of any loss of habitat due to erosion or to land-use changes.

5.2.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *favourable*. No monitoring stops were carried out in this habitat due to the small extent present at the site. However, a visual assessment of the habitat indicated that it would probably pass for all attributes. Several ecotypes were present with this habitat appearing along the seaward boundary of the saltmarsh and also appearing as a pioneer community along parts of the strandline.

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 few impacts or activities affecting this habitat at this site, although a very small extent is present. This makes it vulnerable to small changes at the site. The habitat extent is likely to remain small at this site as there are no suitable extensive intertidal mud and sandflats for this habitat.

5.3 Atlantic salt meadows (H1330)

5.3.1 Extent

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

5.3.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-bad*. Twenty-three monitoring stops were carried out in this habitat and six failed. Most of the attributes required for the structure and functions of this habitat reached their targets. The saltmarsh is generally in good condition apart from poaching damage caused by moderate levels of cattle grazing. Poaching exposes bare mud and sediment and damages the sward structure, particularly in the lower saltmarsh zone. This affects about $\frac{1}{3}$ of the saltmarsh area. There are also signs of poaching-induced erosion. The saltmarsh has typical vegetation communities, zonation of vegetation is evident and well-developed in places and one section has a moderately well-developed saltmarsh topography. In contrast, the presence of a pioneer community can be related to poaching by cattle and the presence of this community increases the diversity of the site. There are natural transitions to other coastal habitats at both the lower and upper saltmarsh boundaries. The Atlantic salt meadows form part of a larger coastal ecosystem.

A species of local significance, Sea Wormwood, which is found frequently on saltmarshes around Galway Bay, is present at this site. This species has a scattered distribution in Ireland and is only found recently in eight 10 km² squares around the coast of Ireland (Preston *et al.* 2002). Webb *et al.* (1996) described its distribution as rare and very local although it is not recorded as a rare species in The Red Data Book (Curtis & McGough 1988).

Sea Purslane (*Atriplex portulacoides*) is also present at this site and was recorded at two locations. This is another species of local distinctiveness. This species is mainly distributed along the eastern coast of Ireland and is only found in six 10 km² squares along the west coast. Curtis and Sheehy-Skeffington (1998) have discussed the distribution of this species and hypothesised that its lack of abundance on the west coast compared to the east coast is related to the higher levels of grazing on west coast saltmarshes. The lack of grazing on some of the saltmarshes in Galway Bay may be one of its reasons for its presence on saltmarshes in Galway Bay.

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. The main impact affecting this site is grazing, which is having some negative impact in places, mainly by causing poaching damage. A small reduction in grazing intensity may be beneficial for this site. Most of the saltmarsh habitats are within a cSAC, so the habitat should not be affected by other land-use changes.

6 Management Recommendations

There are no specific management recommendations for Annex I saltmarsh species at this site.

7 References

Curtis, T.G.F. & McGough, H.N. (1988). *The Irish Red Data Book*. Stationary Office, Dublin.

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8 Appendix I

Table 8.1. Areas of SMP habitats mapped using GIS.

SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 <i>Salicornia</i> flats	0.018	0.018				
2	Spartina swards						
3	1330 Atlantic salt meadow			13.295			
4	1410 Mediterranean salt meadow						
5	ASM/MSM mosaic (50/50)						
6	ASM/ <i>Spartina</i> mosaic						
7	1330/other SM (CM2) mosaic						
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	20.36					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)						
11	Isolated <i>Spartina</i> clumps on mud (5%)						
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic						
14	<i>Spartina</i> sward dominated, with some ASM						
15	1310/ <i>Spartina</i> mosaic						
16	ASM dominated with some <i>Spartina</i>						
17	1330/sand dune mosaic						
18	Other SM (CM2)	0.842					
19	1330/rocky shore mosaic	0.132		0.66			
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	34.697	0.018	13.361			



Legend

- SAC Boundary
- 1310 Salicornia flats
- 1330 Atlantic salt meadows
- 1330/rocky shore mosaic
- Other Saltmarsh (CM2)
- other
- 1330 monitoring stops

 <small>Comhaltas, Oifigeann agus Institiúid Environment, Heritage and Local Government National Parks and Wildlife Service</small>	Saltmarsh Monitoring Project 2007-2008	Kinvarra-West Galway Bay Complex SAC (000268)	SMP code: SMP0089	 0 100 200 300 400 500 Meters	Date of production: 22/02/2009 Map version: 1	Original Drawing Size: 297 x 420 (A3) Scale: 1:7000 
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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 maps by permission of the Government (Permit number: 9993).

was used to draw the cSAC site boundary and there are some errors between this map and the actual ground as indicated from the aerial photos. One larger exclusion is due to the lower shoreline boundary being used to draw the cSAC boundary in error.

The saltmarsh was easily accessed by several points where minor roads pass along the shoreline. A relatively new track across the intertidal zone accesses the island.

3 Saltmarsh Habitats

3.1 General description

The saltmarsh habitat is distributed along both sides of the inlet between Scanlan's island and the mainland. The main saltmarsh development is situated along both sides of the more sheltered eastern part of the inlet, in a small area sheltered by the sandy spit and along the northern mainland shore. There is also minor saltmarsh development with narrow ribbons of habitat developing along some parts of the shoreline around the inlet. There is no or very little saltmarsh development along the more exposed western and southern sides of Scanlan's Island. Some of the shoreline around the inlet has low steep cliffs several metres high along glacial deposits, which prevent saltmarsh development.

The minor road that accesses this area from Finvarra passes along the northern shoreline and the main section of saltmarsh development in this section. There are signs of old coastal protection or fish traps, land division creating enclosures and possible land reclamation in this section of saltmarsh. Part of the shoreline has been infilled as possible coastal protection measures and the path across intertidal zone to the island has also be cleared or improved in the recent past. The saltmarsh transitions to dry coastal grassland at its upper boundary that is somewhat semi-improved, with Creeping Thistle (*Cirsium arvense*) Perennial Ryegrass (*Lolium perenne*), White Clover (*Trifolium repens*) and Twitch (*Elytrigia repens*). Other species present in a more typical landward transition are Sea Beet (*Beta maritima*), Creeping Bent-grass (*Agrostis stolonifera*), Sea Mayweed (*Tripleurospermum maritimum*), Silverweed (*Potentilla anserina*), Lesser Sea-spurrey (*Spergularia media*), Spear-leaved Orache (*Atriplex prostrata*) and Frosted Orache (*Atriplex lacinata*). The saltmarsh transitions to mixed sediment and cobble at its lower boundary.

Saltmarsh has also developed in the leeward side of a sheltered sandy spit with two separate inlets that is situated at the western side of the site. This saltmarsh is also sheltered by a breakwater. There are several yachts and boats moored in this area. The saltmarsh transitions to fixed dune grassland at its upper boundary on the spit. There are also transitions to a low glacial till cliff along the northern part of shoreline. There are transitions to intertidal sand flats and to muddy shingle at the lower saltmarsh boundary

The eastern side of the inlet contains abundant scattered exposed rock in the intertidal area. There are several sections of saltmarsh that have developed amongst and on exposed limestone pavement in the intertidal area along the mainland shore. Some of the saltmarsh is mapped as a mosaic of ASM and rocky shore. This area also contains several low stone walls across the intertidal zone that may be old fish traps or areas to collect brown algae. Several large patches of grassy saltmarsh are situated along the island shoreline, where the shoreline is more gradually sloped towards the intertidal zone. A track accessing different parts of the island follows this shoreline and crosses the saltmarsh occasionally. This saltmarsh transitions to tussocky dry coastal grassland. These patches of saltmarsh also show signs of old coastal protection works.

The main saltmarsh habitat at this site is Atlantic salt meadows (ASM) (Table 3.1). *Salicornia* flats are also present. This habitat is associated with some of the pans in the ASM and is also distributed along the sheltered lower boundary of the ASM at the eastern end of the inlet. This habitat is also found in the sandy inlet protected by the spit and the western side of the site. There is natural gradual transition from ASM to *Salicornia* flats at this location.

Table 3.1. Area of saltmarsh habitats mapped at Scanlan's Island.

EU Code	Habitat	Area (ha)
1310	<i>Salicornia</i> and other annuals colonizing mud and sand (1310)	0.113
1330	Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)	4.457
	Total	4.570

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

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

This habitat is found in several different areas and in different situations at this site. Several small patches (< 5 m² in diameter) are situated in some of the pans in the northern saltmarsh section. These pans contain both Glasswort and Annual Sea-blite, and also contain cobbles.

This habitat is also found on a sandy accretion ridge in one of the small inlets adjacent to the sandy spit. The vegetation is again dominated by Glasswort, with several Annual Sea-blite plants also present. Zonation within the habitat is not really evident but there is a natural gradual transition between the *Salicornia* flats and the adjacent ASM habitat. There are also several patches associated with pioneer saltmarsh zones on mixed muddy shingle and mixed gravel/cobble sediment. These patches also contain infrequent Lax-flowered Sea Lavender and several Sea Purslane plants.

This habitat is also found in a narrow strip along the seaward ASM boundary on the east side of Scanlan's Island.

3.3 Atlantic salt meadows (H1330)

There are several typical saltmarsh communities present at this site with lower, upper and pioneer vegetation represented. The typical mid marsh *Armeria-Plantago* sward is poorly represented. Zonation of the saltmarsh plant communities is clearly seen. The saltmarsh topography is poorly developed, but that is typical of these relatively small sections of saltmarsh habitat.

The saltmarsh located in the sandy spit at the western side of the site does not contain any typical saltmarsh topography, as it is essentially a ribbon of habitat around a semi-circular bay in the northern inlet. Rocks and cobbles are occasionally scattered over the saltmarsh that have been blown over from the storm beach along the outer spit. The southern inlet is narrower and is emptied by a single narrow creek. Zonation of the saltmarsh vegetation is evident in this section, even though the saltmarsh is relatively narrow in places. The lower zone is dominated by Common Saltmarsh-grass and also contains Lax-flowered Sea Lavender (*Limonium humile*), Annual Sea-blite (*Suaeda maritima*), Glasswort, Sea Aster (*Aster tripolium*), Sea Plantain (*Plantago maritima*) and Sea Pink (*Armeria maritima*). The upper zone is dominated by Red Fescue and also contains Creeping Bent-grass, Sea Pink, Sea Milkwort (*Glaux maritima*), Sea Beet (*Beta maritima*), Spear-leaved Orache, Sea Arrowgrass (*Triglochin maritimum*), Sea Plantain and Curled Dock (*Rumex crispus*). The sandy spit is not grazed. Sea Purslane is relatively rare in this section.

An accretion ridge is located along the seaward boundary of the ASM in one of the small inlets adjacent to the sandy spit. There is a transition from ASM to *Salicornia* flats along part of this ridge. Another section directly transitions to sand flats. The pioneer zone contains Common Saltmarsh-grass, Glasswort and Annual Sea-blite. Another patch of pioneer saltmarsh also contains Sea Purslane.

A small strip of ASM saltmarsh is situated behind a relatively new embankment and lane that accessed the house and weir at the west of the site. This saltmarsh contains Sea Purslane and also contains patches of pioneer saltmarsh that are colonising the old lane access.

The northern section of saltmarsh has similar vegetation communities. The vegetation zonation is well-developed. The lower zone is dominated by Common Saltmarsh-grass and Red Fescue is abundant in the upper saltmarsh zones. Part of this saltmarsh also has a low ridge or stone wall marking the boundary between the upper and lower saltmarsh and may be an indication of older land reclamation or infilling of this section. There is a typical low saltmarsh cliff (0.4 m high) along the edge of the northern section of saltmarsh. There are some signs of erosional features with tussocks present. Some of the erosion along the seaward edge may be poaching induced. Some of this saltmarsh cliff is protected by an old stone wall. Some salt pans are present in the saltmarsh area along the northern side of the inlet, which contain small patches of *Salicornia* flats habitat. There are no significant creeks but this is typical of these relatively small sections of saltmarsh.

The larger saltmarsh areas that have developed along the eastern side of Scanlan's Island are similar in nature to the saltmarsh described above. The saltmarsh is lightly grazed. Most of the saltmarsh contains a lower-mid saltmarsh community dominated by common Saltmarsh-grass and Sea Plantain. This saltmarsh vegetation transitions into a virtually pure Red Fescue-dominated sward. There are also several low embankments that mark the boundary between lower and upper saltmarsh and probably indicate infilling and attempts at reclamation in the past.

An unusual saltmarsh community has developed along the east side of the inlet. Exposed rock is much more frequent on the saltmarsh. Saltmarsh vegetation has developed on thin layers of mud amongst and overlaying exposed limestone pavement. The patches of saltmarsh are eroded and the overall topography is quite irregular with frequent exposed pavement and loose rock. The vegetation is dominated by Common saltmarsh-grass. There are frequent small hollows. There are occasionally thick patches of brown algae on the lower saltmarsh patches. The upper saltmarsh zone contains rare Sea Purslane bushes.

The saltmarsh at the southern end of the island eventually develops into a narrow strip of patchy vegetation with Lax-flowered Sea Lavender and Sea Beet growing on cobbles along a storm beach shoreline. Some of the saltmarsh on the eastern side of the inlet shows signs of heavier grazing and poaching intensity.

4 Impacts and Activities

Several impacts and activities affect this site with a range of intensities (Table 4.1). The main impact is grazing. Most of the saltmarsh is probably lightly grazed (140) by cattle or not grazed significantly. Much of the saltmarsh on Scanlan's Island may be accessed by cattle that are moving from one pasture to the next. However, there are several areas with signs of heavier poaching damage (143), usually associated with the lower saltmarsh. Some of the erosional features along the lower saltmarsh boundary may be poaching induced. The eastern side of the mainland also displayed signs of poaching damage.

The track and/or breakwater across the intertidal zone to the island has been improved in the recent past (501). It is not known if these improvements occurred during the current monitoring period. This has not affected adjacent saltmarsh habitats. The track continues along the eastern side of the island and allows access to different enclosures. This track occasionally crosses the saltmarsh or small patches of saltmarsh are situated along the edge of the track.

There has been some infilling of a small area along side the minor road that passes along to the tip of the Finvarra peninsula. This infilling may be related to coastal protection (871) and/or disposal of waste road material. Some rock armour has also been built along side the road further west where the road meets the shoreline (871) but no saltmarsh was affected. A relatively new access lane to a house and weir/lobster holding area at the western side of the site has also been constructed in the recent past (501). It is not known if these improvements occurred during the current monitoring period. The old access lane along the shoreline is still visible. The OSI 1995 series aerial photos are not available for this site.

Erosion (900) at the site is not significant. Some of the lower saltmarsh boundaries have low saltmarsh cliffs and erosional features like tussocks but this is typical of this sort of sheltered site. However, there has been no measurable loss of saltmarsh within the current monitoring period.

A comparison of the OSI 2nd edition 6 inch map to the OSI 2000 series aerial photos shows that there have been no significant changes along the edge of the saltmarsh in the past 100 years but these losses are not assessed. There are some minor losses of saltmarsh along the northern saltmarsh section. There are also signs of accretion (910) on the ground along part of the lower ASM boundary in one of the saltmarsh sections, although there are no indications from the comparison of the maps and aerial photos that the saltmarsh has grown measurably. The position of the sandy spit and associated saltmarsh has changed somewhat at its tip in the past 100 years, with some minor losses and gains to the saltmarsh.

Impacts and activities adjacent to the site include dispersed habitation (403), and fertilization (120) and grazing of livestock (140) related to farming practises. There does not seem to be any aquaculture or fishing at present in the local area. The sandy spit is used for mooring yachts (621). These activities have little or no impact on the saltmarsh habitats present at the site.

Table 4.1. Intensity of various activities on saltmarsh habitats at Scanlan's Island.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1310	140	C	0	0.113	Inside
1330	140	B	0	4.382	Inside
1330	143	B	-1	0.075	Inside
1330	501	C	-1	1.00	Inside
1330	871	A	-2	0.02	Inside
1330	900	C	0	4.457	Inside
1330	910	C	0	4.457	Inside

¹ EU codes as per Interpretation Manual.

² Description of activity codes are found in Appendix III, Summary Report 2007-2008.

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

⁴ Impact is rated as -2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence.

⁵ Location of activity: Inside = activities recorded within and directly impacting the saltmarsh habitat, outside = activities recorded outside but adjacent to saltmarsh habitat that are impacting the saltmarsh habitat.

5 Conservation status

5.1 Overall Conservation Status

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

Scanlan's Island is a relatively small saltmarsh but with several features of interest such natural transitions to other coastal habitats and the presence of an unusual saltmarsh/exposed limestone pavement mosaic. A species of local distinctiveness (Sea Purslane) is present on the site. Two monitoring stops out of thirteen failed.

The overall conservation status of this site is *unfavourable-inadequate* (Table 5.1). There are few impacts or activities that are significantly affecting this site. Small parts of the saltmarsh have been damaged by heavy

poaching (10%) but most of the saltmarsh is in good condition and is only lightly grazed. Small sections have also been negatively impacted by infilling for coastal protection (0.4%).

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are low-moderate. Much of the saltmarsh is enclosed by stone walls and/or embankments that protect agricultural grassland and there are few prospects for landward migration. Some of the saltmarsh has landward transitions to dry coastal grassland and therefore provide some scope for natural landward transition. However, these are very general predictions.

This site is located within the Galway Bay Complex cSAC. A MPSU conservation plan is available for the saltmarsh habitats at this SAC. However, not all the saltmarsh habitat is located within the cSAC boundary.

Table 5.1. Conservation status of Annex I saltmarsh habitats at Scanlan’s Island.

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

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

5.2.1 Extent

The extent of this habitat is assessed as *favourable*. This habitat is found in several different situations and is also found on an accretion ridge. There are no indications of any loss of habitat due to erosion or to land-use changes during the current monitoring period.

5.2.2 Habitat structure and functions

The structure and function of this habitat is assessed as *favourable*. The habitat is found in several different situations and on different substrates. It is found on sandy substrate, muddy shingle and mixed sediment. It is found in pans amongst the ASM, on an accretion ridge with a gradual transition to pioneer ASM and on bare sediment along the seaward boundary (very low SM cliff) of the ASM.

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 few impacts or activities affecting this habitat at this site. Continuing accretion at several locations where there are accretion ridges may increase the extent of this habitat in the future.

5.3 Atlantic salt meadows (H1330)

5.3.1 Extent

The extent of this habitat is assessed as *favourable*. There are no indications of any significant loss of habitat due to erosion or to land-use changes within the current monitoring period. A small patch of ASM is likely to have been destroyed by infilling related to coastal protection. However, this is only a minor area (0.4% of the total ASM area).

There are indications of attempted land reclamation on the saltmarsh in the past. However, these attempts do not seem to have affected the extent of saltmarsh significantly, (the saltmarsh may have re-developed in the re-claimed area). Some saltmarsh along several tracks on the site may have been lost due to improvement. There are likely to be some natural losses and gains of saltmarsh habitat related to the movement of the sandy spit at the western side of the site. These impacts are not assessed as they occurred outside the current monitoring period.

5.3.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Eleven monitoring stops were carried out in this habitat and two failed. Most of the attributes required for the structure and functions of this habitat reached their targets. The main reason for the failed stops was overgrazing and poaching damage. Several typical ASM communities were recorded on this site and zonation was evident with upper mid and lower zone saltmarsh communities. In addition some pioneer ASM vegetation is present at this site, as is a notable vegetation type where saltmarsh vegetation forms a mosaic with exposed limestone pavement. The saltmarsh topography is poorly developed but this is typical of a small site of this nature. There are natural transitions to other coastal habitats including *Salicornia* flats at both the lower and upper saltmarsh boundaries. The Atlantic salt meadows form part of a larger coastal ecosystem.

Sea Purslane is also present at this site and was recorded at several locations. This is another species of local distinctiveness. This species is mainly distributed along the eastern coast of Ireland and is only found in six 10 km² squares along the west coast. Curtis and Sheehy-Skeffington (1998) have discussed the distribution of this species and hypothesised that its lack of abundance on the west coast compared to the east coast is related to the higher levels of grazing on west coast saltmarshes. The lack of grazing on some of the saltmarshes in Galway Bay may be one of its reasons for its presence on saltmarshes in Galway Bay.

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 such as grazing continue in the near future. Overgrazing and poaching damage is the main activity affecting part of the ASM at this site less than 10% of the ASM is affected. There are few other impacts or activities significantly affecting this site. There are few prospects for the loss of habitat due to erosion in the future. The site is within a cSAC so the most of the habitat should not be affected by land-use changes such as development. (Some of the habitat is located outside the cSAC boundary and is therefore unprotected by the nature conservation designation. Impacts and activities such as coastal protection and infilling should be controlled and licensed by local and national authorities.

6 Management Recommendations

There are no management recommendations recommended for this site.

7 References

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

8 Appendix I

Table 8.1. Areas of SMP habitats mapped using GIS.

SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 <i>Salicornia</i> flats	0.113	0.113				
2	Spartina swards						
3	1330 Atlantic salt meadow	4.273		4.273			
4	1410 Mediterranean salt meadow						
5	ASM/MSM mosaic (50/50)						
6	ASM/ <i>Spartina</i> mosaic						
7	1330/other SM (CM2) mosaic	0.282		0.141			
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	4.226					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)						
11	Isolated <i>Spartina</i> clumps on mud (5%)						
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic						
14	<i>Spartina</i> sward dominated, with some ASM						
15	1310/ <i>Spartina</i> mosaic						
16	ASM dominated with some <i>Spartina</i>						
17	1330/sand dune mosaic						
18	Other SM (CM2)	0.173					
19	1330/rocky shore mosaic	0.085		0.043			
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	9.152	0.113	4.457			



Legend

- SAC Boundary
- 1310 Salicornia flats
- 1330 Atlantic salt meadows
- 1330/other SM (CM2) mosaic
- 1330/rocky shore mosaic
- Other Saltmarsh (CM2)
- other
- 1310 monitoring stops
- 1330 monitoring stops

	Saltmarsh Monitoring Project 2007-2008	Scanlan's Island	SMP code: SMP0088		
	Galway Bay Complex SAC (000268)	This habitat map was created with a combination of fieldwork, GPS and interpretation of aerial photos. Boundaries of designated sites are subject to revision. Produced from Ordnance Survey material by permission of the Government (Permit number 995)	Date of production: 22/02/2009 Map version: 1	Original Drawing Size: 297 x 420 (A3) Scale: 1:4000	