

**Castlemaine Harbour SAC (site code 343)  
Conservation objectives supporting document  
-coastal habitats**

**NPWS**

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

## 1 Introduction

Achieving Favourable Conservation Status (FCS) is the overall objective to be reached for all Annex I habitat types and Annex II species of European Community interest listed in the Habitats Directive 92/43/EEC (Commission of the European Communities, 2003). It is defined in positive terms, such that a habitat type or species must be prospering and have good prospects of continuing to do so.

Castlemaine Harbour SAC is designated for a range of marine, coastal and terrestrial habitats including estuaries, alluvial wet woodlands, saltmarsh, vegetated shingle and sand dunes. The site is also selected for the following species listed on Annex II of the EU Habitats Directive – Sea Lamprey, River Lamprey, Atlantic Salmon, Otter and the liverwort, Petalwort (*Petalophyllum ralfsii*), the latter of which is associated with dune slacks. The following ten coastal habitats are included in the qualifying interests for the site (\* denotes a priority habitat):

- 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)
- Annual vegetation of driftlines (1210)
- Embryonic shifting dunes (2110)
- Shifting dunes along the shoreline with *Ammophila arenaria* (2120)
- Fixed coastal dunes with herbaceous vegetation (grey dunes (2130) \*)
- Dunes with *Salix repens* (2170)
- Humid dune slacks (2190)

The first habitat is associated with shingle, the next three are found in saltmarshes and the remainder are associated with sand dune systems, where they occur in complex mosaics. Castlemaine Harbour is unusual in that all of the coastal habitats listed above occur in close association with each other and it is one of the best sites in the country for transitional communities between saltmarsh and sand dune systems.

This backing document sets out the conservation objectives for the ten coastal habitats listed above in Castlemaine Harbour SAC, which is defined by a list of parameters, attributes and targets. The main parameters are (a) Area, (b) Range 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) (Moore & Wilson, 1999) and the Coastal Monitoring Project (Ryle *et*

*al.*, 2009). Two sub-sites within Castlemaine Harbour SAC were visited by Moore & Wilson (1999): Inch and Cromane, while some vegetated shingle was recorded at Rosbehy during the Coastal Monitoring Project (Ryle *et al.*, 2009).

During the National Shingle Beach Survey 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. Cromane was rated 'high interest', while Rosbehy was rated 'low interest' primarily owing to the recent construction of a car park. The habitat was not mapped but the vegetation was recorded, as were the human impacts and alterations at the site, which are useful tools for assessing the Structure & Functions of the site.

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

The SMP surveyed, mapped and assessed four sub-sites within Castlemaine Harbour SAC (McCorry & Ryle, 2009):

1. Inch
2. Rosbehy
3. Cromane
4. Whitegate-Fybagh

As part of the SMP detailed individual reports and habitat maps were produced for each site and these are included in a set of Appendices to this document (Appendix I to IV). The conservation objectives for the saltmarsh habitats in Castlemaine Harbour are based on a combination of the findings of the individual reports for each of these sites. There are additional areas of saltmarsh known to be present within the site, however, it is estimated that the four sub-sites as surveyed by the SMP represents almost 70% of the total area of saltmarsh within Castlemaine Harbour SAC.

The targets set for the sand dune habitats are based primarily on the results of the Coastal Monitoring Project (CMP) (Ryle *et al.*, 2009) and this document should be read in conjunction with this report. Gaynor (2008) was also used to describe and assess the quality of the dune habitats found at the two large dune systems within Castlemaine Harbour - Inch and Rosbehy. Inch was given the highest 'A' rating for conservation value, while the smaller Rosbehy was assessed as the slightly lower 'B-A' rating for conservation value.

Inch sand spit is the largest and arguably one of the best remaining 'intact' dune systems in the country. Inch is a highly dynamic, naturally functioning system. One of the few actively accreting systems on the west coast, the site displays a clear succession from strandline, through foredunes, mobile yellow dunes, fixed grey dunes, dune grassland and dune slacks. There is also a high diversity of vegetation communities evident within these habitats. Inch also displays some of the finest natural transitional zones between sand dunes and saltmarsh habitats. The range of vegetation communities present on Inch occurs as a complex mosaic throughout the site. The dunes are also of significant ornithological, zoological, geomorphological and archaeological interest. The dunes provide important habitat for the chough (*Pyrrhocorax pyrrhocorax*). The complex hydrology of the site is inextricably linked to the functioning and dynamism of the system. The quality and extent of the dune slacks are extremely important in an Irish context. These provide the necessary habitat for the natterjack toad (*Bufo calamita*), Ireland's only toad and rarest amphibian. The rare petalwort (*Petalophyllum ralfsii*) is also known to occur in these slacks. The site displays a complex geomorphology and is constantly changing and evolving. Most of the high dunes at Inch are residual dunes, i.e. the original structures have been reworked into ridges running parallel to the direction of the prevailing wind. Consequently bare sand in the form of blow-outs is a feature of the site. These blow-outs represent an integral and natural component of an evolving and highly dynamic dune system such as Inch. A number of kitchen middens, which give the site an added archaeological interest, are also found close to the slacks towards the southern tip of the spit.

The smaller Rosbehy spit lies opposite Inch spit, extending into Dingle Bay from a point on the southern shore of the Bay, approximately 2.5km from Glenbeigh town. The spit extends northwards for approximately 4 km, and consists of a shingle bar, over which an extensive sand dune system has formed. The spit displays a clear zonation of typical dune vegetation types, progressing through communities of the strandline, foredunes, yellow dunes, fixed grey dunes, dune grassland and dune slacks, grading into a saltmarsh on the eastern flank. The transitional zone between the saltmarsh and sand dunes is known to support populations of two rare species: *Petalophyllum ralfsii* and *Bryum marratii*. Although quite narrow where it adjoins the mainland, the spit broadens to over 500m at the widest point. There is considerable on-going erosion of the western face of the spit. The site is owned and managed by Kerry County Council and is subject to high recreational pressure. The site is considered to be undergrazed with low numbers of sheep and rabbits.

As part of the Coastal Monitoring Project (CMP) detailed individual reports and habitat maps were produced for each site and these are included in a set of Appendices to this document (Appendix V & VI). The conservation objectives for the sand dune habitats in Castlemaine Harbour are based on the findings of the individual reports for each of these sites, combined with the results of Gaynor (2008). It is thought that the two sub-sites as surveyed by the CMP

represents the total area of sand dunes within Castlemaine Harbour SAC, although some of the pioneer communities, in particular the annual vegetation of driftlines, may be found elsewhere throughout the 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 above the high tide mark on beaches comprised of shingle (cobbles and pebbles). It is dominated by perennial species (i.e. plants that continue to grow from year to year). Vegetated shingle occurs on deposits of shingle lying at or above mean high-water spring tides. 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 Castlemaine Harbour 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.

The exact current extent of this habitat is unknown, but the sand spits at Inch and Rosbehy are known to be underlain by shingle. It often occurs in close association with the intertidal area, saltmarsh and sand dunes habitats.

### **3.3 Range**

#### **3.3.1 Habitat distribution**

Extensive accumulations of shingle form the bases of the spits at Inch, Rosbehy and Cromane. Castlemaine Harbour is a highly dynamic system where the natural processes of erosion and accretion are actively on-going. Sediment is regularly re-distributed throughout the site.

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

### **3.4 Structure and Functions**

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

#### **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 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 in the different sub-communities associated with this habitat. The shingle at Rosbehy has been compromised by the construction of a car park but Cromane is known to support a typical flora with species such as spear-leaved orache (*Atriplex prostrata*), sea mayweed (*Tripleurospermum maritimum*), sea beet (*Beta maritima*), silverweed (*Potentilla anserina*), curled dock (*Rumex crispus*), lyme grass (*Leymus arenarius*), sea sandwort (*Honckenya peploides*) and sea radish (*Raphanus raphanistrum* ssp. *maritimus*). Two Red Data Book plant species, Sea Pea (*Lathyrus japonicus*) and Sea-kale (*Crambe maritima*) have also been recorded from shingle at this site.

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

#### **3.4.4 Vegetation composition: negative indicator species**

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

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

## **4 Saltmarsh habitats**

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

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

The first three of these habitats are found within Castlemaine Harbour SAC, with Mediterranean salt meadows occupying the greatest proportion of the saltmarsh area. The saltmarsh at Inch in particular is closely associated with dune systems. The site is notable for the presence of the rare *Salicornia* sub-type community – *Sagino maritimae-Cochlearietum danicae*, which is confined to a narrow band between the saltmarsh and sand dune communities (McCorry & Ryle, 2009). Detailed descriptions of each habitat in Castlemaine Harbour can be found in Appendices I to IV.

#### **4.1 Overall Objectives**

The overall objective for ‘Salicornia and other annuals colonising mud and sand’ in Castlemaine Harbour SAC is to ‘maintain the favourable conservation condition’.

The overall objective for ‘Atlantic salt meadows’ in Castlemaine Harbour SAC is to ‘maintain the favourable conservation condition’.

The overall objective for ‘Mediterranean salt meadows’ in Castlemaine Harbour SAC is to ‘maintain the favourable conservation condition’.

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

#### **4.2 Area**

##### **4.2.1 Habitat extent**

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. The target is no decrease in extent from the established baseline. 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 Castlemaine Harbour during the SMP. These maps are included with the individual site report in an Appendix at the end of this document. A total of 105.18ha of saltmarsh habitat was mapped by the SMP within the SAC

at the four sub-sites and an additional 52.70ha of potential saltmarsh habitat was identified using aerial photographs, to give a total estimated area of 157.88ha 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.

<b>Sub-site</b>	<b>Total area (ha) of Salicornia mudflats (excluding mosaics) from SMP</b>	<b>Total area (ha) of Salicornia mudflats within SAC boundary (including mosaics)</b>
Inch	1.241	1.241
Rosbehy	0.002	0.002
Cromane	-	-
Whitegate-Fybagh	-	-
<b>Total</b>	<b>1.243</b>	<b>1.243</b>
Potential habitat	-	-
<b>Total</b>	<b>1.243</b>	<b>1.243</b>

<b>Sub-site</b>	<b>Total area (ha) of ASM (excluding mosaics) from SMP</b>	<b>Total area (ha) of ASM within SAC boundary (including mosaics)</b>
Inch	9.483	9.659
Rosbehy	7.286	7.280
Cromane	13.907	9.543
Whitegate-Fybagh	2.553	2.716
<b>Total</b>	<b>33.229</b>	<b>29.198</b>
Potential habitat	4.788	4.788
<b>Total</b>	<b>38.017</b>	<b>33.986</b>

<b>Sub-site</b>	<b>Total area (ha) of MSM (excluding mosaics) from SMP</b>	<b>Total area (ha) of MSM within SAC boundary (including mosaics)</b>
Inch	29.112	29.049
Rosbehy	16.096	14.900
Cromane	29.315	28.053
Whitegate-Fybagh	2.605	2.723
<b>Total</b>	<b>77.128</b>	<b>74.732</b>
Potential habitat	47.909	47.909
<b>Total</b>	<b>125.037</b>	<b>122.641</b>

There are a number of differences in the figures above. Most of the differences can be explained by the fact that the SMP mapped the total saltmarsh resource at Dundalk 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.

### **4.3 Range**

#### **4.3.1 Habitat distribution**

Extensive areas of saltmarsh are known to occur at Inch, Cromane and Rosbehy, with smaller areas at Whitegate-Fybagh and scattered throughout the site. Mediterranean salt meadows are the most common and widely distributed habitat, while Atlantic salt meadows and *Salicornia* mudflats are less frequent.

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 three saltmarsh habitats in Castlemaine Harbour in terms of its structure and functions depends on a range of attributes for which targets have been set as outlined below.

#### **4.4.1 Physical structure: sediment supply**

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

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

#### **4.4.2 Physical structure: creeks and pans**

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

saltmarsh system. Major erosion of saltmarsh is indicated by internal dissection and enlargement of the drainage network, ultimately leading to the creation of mud basins.

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

#### **4.4.3 Physical structure: flooding regime**

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

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

#### **4.4.4 Vegetation structure: zonation**

Saltmarshes are naturally dynamic coastal systems. As is the case on the majority of Irish saltmarshes, MSM is the dominant saltmarsh habitat at Castlemaine Harbour where it occurs in a mosaic with other saltmarsh habitats, including 'Salicornia and other annuals colonising mud and sand' and 'Atlantic 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, in particular those associated with sand dune habitats.

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

#### **4.4.5 Vegetation structure: vegetation height**

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

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

#### 4.4.6 Vegetation structure: vegetation cover

Vegetation cover can have a major effect on saltmarsh development by reducing the velocity 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*), 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 Castlemaine Harbour area.

Typical species		
Lower marsh	Low-mid marsh	Mid-upper marsh
<i>Salicornia</i> spp. <i>Suaeda maritima</i> <i>Puccinellia maritima</i> <i>Aster tripolium</i>	<i>Puccinellia maritima</i> <i>Triglochin maritima</i> <i>Plantago maritima</i> <i>Atriplex portulacoides</i> <i>Aster tripolium</i> <i>Spergularia</i> sp. <i>Suaeda maritima</i> <i>Salicornia</i> spp. <i>Glaux maritima</i> Turf fucoids	<i>Festuca rubra</i> <i>Juncus gerardii</i> <i>Armeria maritima</i> <i>Agrostis stolonifera</i> <i>Limonium humile</i> <i>Glaux maritima</i> <i>Seriphidium maritimum</i> <i>Plantago maritima</i> <i>Aster tripolium</i> <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

#### 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*). Significantly large stands of *Spartina* have been recorded within Castlemaine Harbour (see Appendices I to 4) and the continued spread of this species is considered a potential threat to the *Salicornia* mudflats.

Sub-site	Area (ha) of <i>Spartina</i> swards mapped during the SMP (McCorry & Ryle, 2009)
Inch	43.354
Rosbehy	0.147
Cromane	1.007
Whitegate-Fybagh	0.147
<b>Total</b>	<b>44.655</b>

The target is that negative indicators such as *Spartina* should be absent or under control. The current aim for this particular site is to limit expansion to less than 1% per annum during a reporting cycle.

## 5 Sand dune habitats

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

In Ireland, there are 9 sand dune habitats (including annual vegetation of driftlines) listed under Annex I of the EU Habitats Directive (92/43/EEC) (\* denotes a priority habitat):

- **Annual vegetation of driftlines (1210)**
- **Embryonic shifting dunes (2110)**
- **Shifting dunes along the shoreline with *Ammophila arenaria* (2120)**
- **Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130) \***

- Decalcified dunes with *Empetrum nigrum* (2140) \*
- Decalcified dune heath (2150) \*
- **Dunes with *Salix repens* (2170)**
- **Humid dune slacks (2190)**
- Machair (21AO) \*

The six habitats indicated in bold above are found within Castlemaine Harbour SAC, with the priority habitat 'fixed coastal dunes with herbaceous vegetation' occupying the greatest proportion of the sand dune area. The sand dunes at Inch in particular are closely associated with saltmarsh habitats. The site is notable for the presence of the rare *Salicornia* sub-type community – Sagino maritimae-Cochlearietum danicae, which is confined to a narrow band between the saltmarsh and sand dune communities (McCorry & Ryle, 2009). Detailed descriptions of each sand dune habitat in Castlemaine Harbour can be found in Appendices V & VI.

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

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

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



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

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

Dunes with creeping willow (*Salix repens*) occur where this shrub forms a dense ground cover and are found in close association with dune slacks. The distinguishing feature is the proximity of the water-table to the surface, which in the case of dunes with *S. repens* is below a level where it exerts an influence on the vegetation. As a result, the moisture-loving plants generally associated with dune slacks are noticeably reduced or absent. Dunes with *S. repens* are often found on sandy hummocks within slacks, or on the sides of dune ridges adjacent to slacks.

All of the dune habitats indicated above occur as a complex mosaic of constantly changing and evolving vegetation communities. They are inextricably linked in terms of their ecological functioning and should be regarded as single geomorphological and hydrological units. As such, no dune habitat should be considered in isolation from the other dune habitats present at a site, or the adjoining semi-natural habitats with which they often form important transitional communities. Detailed descriptions from the Coastal Monitoring Project of each sand dune habitat at Inch and Rosbehy can be found in Appendices V & VI.

## **5.1 Overall objectives**

The overall objective for 'Annual vegetation of driftlines' in Castlemaine Harbour SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Embryonic shifting dunes' in Castlemaine Harbour SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Shifting dunes along the shoreline with *Ammophila arenaria*' in Castlemaine Harbour SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Fixed coastal dunes with herbaceous vegetation' in Castlemaine Harbour SAC is to 'restore the favourable conservation condition'.

The overall objective for 'Dunes with *Salix repens*' in Castlemaine Harbour SAC is to 'maintain the favourable conservation condition'.

The overall objective for 'Humid dune slacks' in Castlemaine Harbour SAC is to 'maintain the favourable conservation condition'.

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

## **5.2 Area**

### **5.2.1 Habitat extent**

Habitat extent is a basic attribute to be assessed when determining the condition of a particular habitat. Baseline habitat maps were produced for the sand dune habitats in Castlemaine Harbour during the Coastal Monitoring Project (Ryle *et al.*, 2009). These maps are included with the individual site reports in Appendices V and VI at the end of this document. The current extent of each sand dune habitat was estimated using these maps, however, the figures for Rosbehy were based on a ground survey, while those for Inch were estimated from the 2000 aerial photograph. A total of 539.16ha of sand dune habitat was mapped by Ryle *et al.* (2009) within the SAC at the two sub-sites.

The total areas of each sand dune habitat within the SAC as mapped by the Ryle *et al.* (2009) are presented in the following table.

Habitat	Area mapped by Ryle <i>et al.</i> (2009) (ha)		
	Inch	Rosbehy	Total
Annual vegetation of driftlines	1.168	0.735	1.903
Embryonic shifting dunes	14.405	0.792	15.197
Shifting dunes along the shoreline with <i>Ammophila arenaria</i>	25.798	10.418	36.216
Fixed coastal dunes with herbaceous vegetation	352.236	99.072	451.308
Dunes with <i>Salix repens</i>	0.343	-	0.343
Humid dune slacks	32.365	1.831	34.196
<b>Total</b>	<b>426.315</b>	<b>112.848</b>	<b>539.163</b>

The target for this attribute is 'no decrease in extent from the established baseline'. Bearing in mind that coastal systems are naturally dynamic and subject to change, this target is assessed subject to natural processes, including erosion and succession.

### 5.3 Range

#### 5.3.1 Habitat distribution

Extensive dune systems occur at Inch and Rosbehy. Both systems support all of the dune habitats for which the site is designated, with the exception of dunes with *S. repens*, which is restricted in its distribution to Inch. It is important to assess each of these dune habitats as part of a system rather than in isolation. Inch in particular is constantly evolving and changing and this natural dynamism is part of what makes this site so unique. The wider coastal system of Castlemaine Harbour is also extremely dynamic as evidenced by the recent breach of Rosbehy dunes in December 2000.

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

### 5.4 Structure and Functions

The location, character and dynamic behaviour of sand dunes are governed by a combination of geographic, climatic, edaphic and anthropogenic factors. Sand dunes are highly complex, dynamic systems, where the habitats occur in a complex and constantly evolving and changing mosaic. They function as systems in terms of geomorphology and hydrology and maintaining the favourable conservation condition of the habitats present depends on allowing these processes to continue unhindered. Gaynor (2008) highlights the highly transitional nature of much of the vegetation and stresses the need for a holistic approach when considering the

conservation objectives of the habitats. Species diversity and plant distribution in dunes is strongly controlled by a range of factors, including grazing intensities, moisture gradients, nutrient gradients and human disturbance. Maintaining the favourable conservation condition of all of the sand dune habitats in Castlemaine Harbour in terms of its structure and functions depends on a range of attributes for which targets have been set as outlined below.

#### **5.4.1 Physical structure: functionality and sediment supply**

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

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

Inch is one of the most naturally functioning and dynamic systems in the country, while Rosbehy has been somewhat compromised by the construction of a car park on the shingle at the neck of the spit.

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

#### 5.4.2 Physical structure: hydrological and flooding regime

The conservation of dune slacks and dunes with *S. repens* is inextricably linked with the local hydrological regime. Dune slacks are characterised by the proximity of a groundwater table that is maintained by the combination of an impermeable layer in the soil, or deeper salt water and precipitation. Dunes with *S. repens* are closely associated with dune slacks but are distinguished from them by a water-table that is at a depth that no longer exerts an influence on the vegetation. Most dune slacks are fed by a range of water sources, including precipitation water, surface water or groundwater. The latter two sources are usually somewhat calcareous while the former is acid.

The most important influence on the nature and vegetation of a dune slack is the groundwater-table, which can fluctuate considerably throughout the year. The fluctuation of the water-table is vital in terms of the ecology of two rare species found here: *Petalophyllum ralfsii* and *Bryum marratii*, the latter of which is found in the transitional areas between the dunes and saltmarsh. The frequency and duration of periods of flooding or inundation determines the vegetation composition. The water-table depth has been identified as the primary determining factor in vegetational variation, followed by weak trends in calcium and sodium availability. Other contributing factors include stage of development, precipitation, distance from the sea, the grazing regime, recreational pressure, nature of the sediment, soil pH and the porosity of the sediment.

Dune slack habitats should never be considered in isolation, but as part of the larger dune system that functions as an eco-hydrological unit. Dune slacks are highly sensitive to human influences on their hydrology, either through water abstraction or drainage works. Most dune slacks are fed by a range of water sources, including precipitation water, surface water or groundwater. Generally, the maintenance of a naturally functioning dune slack depends on both the amount of (a) precipitation and (b) groundwater discharge. Water abstraction interferes with the local hydrology, potentially having serious implications for the plant and animal communities of slacks. Abstraction can lower the level of the groundwater-table, causing the slacks to dry out. It can also lead to saline infiltration in slacks formed close to the front of a dune system and particularly where the underlying substrate is highly permeable (e.g. shingle).

The target is to ensure that the hydrological regime continues to function naturally and that there are no increased nutrient inputs in the groundwater.

#### **5.4.3 Vegetation structure: zonation**

The range of vegetation zones on a dune system should be maintained. Gaynor (2008) highlights the highly transitional nature of much of the vegetation, therefore, it is important that the transitional communities are also conserved. At both Inch and Rosbehy the typical zonation of strandline to foredune to mobile dune to fixed dune is observed, with dune slacks occupying the low lying areas and then fine transitions to saltmarsh habitats.

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

#### **5.4.4 Vegetation structure: bare ground**

This target applies to fixed dunes, dunes with *Salix repens* and dune slacks. It does not apply to the other habitats present where high levels of bare sand are a natural component of the habitat. In the fixed and slack areas some degree of instability is vital. Constant cycles of erosion and stabilisation provide the necessary conditions for the establishment of pioneer species and species that favour open conditions including invertebrates, helping to increase biodiversity. These open areas are particularly important for *Petalophyllum ralfsii*, which favours pioneer slacks.

Bare sand can be exposed from the actions of grazing animals, however, it must be borne in mind that even within a moderate grazing regime, some localised damage is to be expected, because the impact of grazing animals is not applied at the same intensity throughout a site.

The target is to achieve up to 10% bare sand, with the exception of pioneer slacks which can have up to 20% bare sand. This target is assessed subject to natural processes, so a system like Inch, which is naturally highly mobile may have levels of bare sand in excess of 10%.

#### **5.4.5 Vegetation structure: vegetation height**

This attribute applies to the more fixed habitats (fixed dunes, dunes with *S. repens* and dune slacks). A varied vegetation structure is important for maintaining species diversity and is particularly important for invertebrates and birds. The ecological benefits of moderate levels of grazing on dunes have been well documented (Gaynor, 2008). Moderate grazing regimes lead to the development of a species-rich vegetation cover. The animals increase biodiversity by creating micro-habitats through their grazing, dunging and trampling activities. Grazing slows down successional processes and in some cases reverses them, helping to achieve a diverse and dynamic landscape. The effects of trampling assist the internal movement of sand through the development of small-scale blowouts, while dunging can eutrophicate those dune habitats whose nutrient-poor status is crucial for the survival of certain vegetation types.

Many species, from plants to invertebrates, benefit immensely from the open and diverse system created by a sustainable grazing regime. Many dune species are small in size and have relatively low competitive ability. Consequently, the maintenance of high species diversity on a dune system is dependent on the existence of some control to limit the growth of rank coarse vegetation (Gaynor, 2008).

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

#### **5.4.6 Vegetation structure: vegetation cover**

The only habitat where this is a specific attribute is humid dune slacks where that target is to maintain less than 40% cover of *S. repens*. This species forms a natural component of many dune slack communities in Ireland, however, high covers of this shrub can lower the level of water-table causing the slacks to dry out. It can also form a dense canopy that shades out slack species leading to a reduction in biodiversity.

The target is therefore to keep the cover of *S. repens* below 40%.

#### **5.4.7 Vegetation composition: plant health of dune grasses**

This attribute and target only applies to the embryonic shifting dunes and the shifting dunes along the shoreline with *Ammophila arenaria*. The health of the dune grasses are assessed by the plant parts above the ground which should be green and the present of flowering heads. This gives a clear indication of the status of the supply of blown sand which is required for these species to thrive.

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

#### **5.4.8 Vegetation composition: typical species & sub-communities**

Inch Spit holds a fine sand dune system. Details of the typical species recorded can be found in the site report in Appendix V. Species diversity and plant distribution in dunes is strongly controlled by a range of factors, including mobility of the substrate, grazing intensities, moisture gradients, nutrient gradients and human disturbance. In the younger, more mobile dunes, Marram (*Ammophila arenaria*) is common, with Groundsel (*Senecio vulgaris*), Sea Rocket (*Cakile maritima*) and Dandelion (*Taraxacum* sp.) also present. The fixed, more stable dunes support Lady's Bedstraw (*Galium verum*), Common Birdsfoot trefoil (*Lotus corniculatus*), Wild Thyme (*Thymus praecox*), Kidney Vetch (*Anthyllis vulneraria*), Wild Pansy (*Viola tricolor*) and Biting Stonecrop (*Sedum acre*), among others. The slightly damper conditions which prevail in dune slacks support Creeping Bent (*Agrostis stolonifera*), Crested

Dog's-Tail (*Cynosurus cristatus*), Glaucous Sedge (*Carex flacca*), Creeping Willow (*Salix repens*) and Jointed Rush (*Juncus articulatus*). The rare bryophyte Petalwort (*Petalophyllum ralfsii*), which is listed on Annex II of the E.U. Habitats Directive, has been recorded in this system.

Detailed lists of the typical species found at Rosbehy can be found in the site report in Appendix VI. In addition, Yellow Centaury (*Cicendia filiformis*) and Knotted Pearlwort (*Sagina nodosa*) have been recorded from a dune slack at Rosbehy along with other, more common species.

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

#### **5.4.9 Vegetation composition: negative indicator species**

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

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

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

#### **5.4.10 Vegetation composition; scrub/trees**

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



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

## 6 References

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## Appendix I – Inch site report from Saltmarsh Monitoring Project (McCorry & Ryle, 2009)

### 1 Site Details

SMP site name: Inch	SMP site code: SMP0075
Dates of site visit 06-08/08/2008	CMP site code: 70
SM inventory site name: Inch	SM inventory site code: 163
NPWS Site Name: Castlemaine Harbour	
NPWS designation	cSAC: 343
	MPSU Plan: old format draft 2 plan available
	pNHA: 343
	SPA: 4029
County: Kerry	Discovery Map: Grid Ref: 066143, 099835 71, 78
Aerial photos (2000 series): O 5930-A,B,C,D; O 5866-D; O 5867-C,D; O 5986- A B	6 inch Map No: Ke 045, 055
Annex I habitats currently listed as qualifying interests for Castlemaine Harbour 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: Cromane, Whitegate,-Fybagh, Rosbehy	
Saltmarsh type: Estuary	Substrate type: Peaty clay, sand

### 2 Site description

Inch is located in south-west Kerry along the northern side of Dingle Bay/Castlemaine Harbour and is located 18 km from Castlemaine. Inch is a long sand spit that divides the shallower Castlemaine Harbour from the outer Dingle Bay, along with the adjacent Rosbehy sand spit, which projects from the southern side of the bay. This sand spit is considered to be one of the finest examples of a sand dune system in the county, particularly as it has not been significantly developed and is relatively intact. Inch beach is an important amenity area and attracts many local people and tourists that visit the area. The beach is popular for swimming and water-sports such as surfing. The northern section is most heavily used and there is some infrastructure such as car-parks and a restaurant located at the northern end of the beach. There is an on-going proposal to develop a golf course at this site. The site is also grazed by sheep and cattle.

The landscape of this area on the adjacent Dingle Peninsula is dominated by steeply sloping land fairly close the shoreline. There is some low-lying land found in the sheltered area adjacent to the sand spit. This area is dominated by wet grassland and marsh land in the low-lying area with some improved grassland on the higher ground. This low-lying ground soon disappears further east and there are steeper slopes along the shoreline that significantly limit the development of saltmarsh.

Saltmarsh is found along the sheltered eastern side of the sand dune complex with a small amount also found along the adjacent mainland shoreline. The survey site included the entire sand spit and included the shore of Castlemaine Harbour between the spit and east of a small river flowing into the bay called Emlagh River. There are very notable and important transitions from tall dunes to transitional wet grassland vegetation and then to saltmarsh communities and onto intertidal flats along a gentle seaward gradient in the northern section. The relatively large size of the site increases the overall diversity and extent of the saltmarsh and transitional communities. There is also a notable gradient from mud to sand towards the tip of the spit and this also influences the saltmarsh habitat. The adjacent intertidal flats also contain a significant area of Eelgrass (*Zostera* spp.) beds.

Inch saltmarsh is part of Castlemaine Harbour cSAC (Site Code 000343). This cSAC covers most of the intertidal and sub-tidal parts of Castlemaine Harbour east of Inch and Rosbehy spits. The cSAC also includes the sand dune complexes at Inch and Rosbehy and the shingle spit at Cromane. The cSAC also includes some of the catchments of the Rivers Laune and Maine, which both flow into the head of the bay and forms the estuary of these rivers. Three Annex I saltmarsh habitats are found at this site, Salicornia flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). All three habitats are listed as qualifying interests for this cSAC. *Spartina* swards are also found on the intertidal flats at this site, although this habitat is not now considered to qualify as an Annex I habitat.

Three other saltmarshes sites listed on the SM inventory (Curtis and Sheehy-Skeffington 1998) and located within this cSAC were surveyed during this project, Rosbehy, Cromane and Whitegate-Fybagh. There is additional saltmarsh development in many of the small indentations along the shoreline, including a significant areas of unsurveyed saltmarsh located between Cromane and the mouth of the River Laune.

This site is notable for the presence of the second rarer Annex I Salicornia flats subtype (*Sagino maritimae*-*Cochlearietum danicae*) (Ephemeral saltmarsh vegetation with *Sagina maritima*). This vegetation community is generally associated with the transition from saltmarsh to sand-dune and has been recorded at several sites in Ireland (Wymer 1984, NPWS 2007b). This transition is usually very narrow (< 1 m wide but sometimes up to 5 m wide) and this plant community is associated with unstable substrate that is affected by erosion or accretion. Turf fucoids are the only species of local distinctiveness recorded at this site and these are typical of saltmarsh found along the western coast of Ireland.

Nearly all the saltmarsh habitat is found within the digital cSAC boundary. The entire saltmarsh habitat found on the sand spit is situated within the cSAC. The cSAC boundary then extends to the east and includes most of the saltmarsh habitat within the cSAC. However the outer berm is used as the cSAC boundary in one section and this excludes some saltmarsh habitat that has developed behind the berm.

The saltmarsh was easily accessed from across the dunes after a bit of a hike.

### 3 Saltmarsh Habitats

#### 3.1 General description

The saltmarsh is located along the eastern sheltered side of the sand dunes along Inch. The majority of the established Annex I saltmarsh habitat is dominated by Mediterranean salt meadows (MSM). However, it should be noted that there is a greater area of *Spartina* sward compared to the total area of Annex I habitat developed on the mudflats adjacent to the established marsh. Most of the saltmarsh habitat is found in the northern half of the site. A band of mainly homogenous MSM saltmarsh about 100 m wide has developed with a transition to transitional wet grassland along a landward gradient. Further north there is some typical saltmarsh zonation with MSM on the landward side and ASM on the seaward side whereas further south the MSM habitat stretches from the upper to lower boundary with no development of ASM vegetation.

Further south the saltmarsh habitat is divided by a small area of sand dune habitat that protrudes into the intertidal area. A second large area of saltmarsh has developed mid way along the sand spit and south of this small protrusion in a low-lying inlet that protrudes into the dunes. Attempts were made in the 19<sup>th</sup> century to reclaim this area and an embankment was built along the seaward side to enclose this inlet. This embankment is now breached. This area is more heterogeneous and while dominated by MSM, it also contains a significant area of ASM, *Spartina* sward and also brackish marsh. Patches of Sea Club-rush (*Bolboschoenus maritimus*) are found towards the landward side particularly along some of the artificial and natural drainage channels in this area. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. Common Cordgrass (*Spartina anglica*) is found more frequently towards the old embankment and forms some mosaics of *Spartina* sward with MSM and ASM.

This saltmarsh transitions to wet grassland with elements of dune slack vegetation along the landward side. This vegetation succession takes place on a gentle gradient with a subtle topological height difference between the MSM and the transitional zone. This meant mapping the upper boundary was difficult in places. The transitional zone is dominated by Sea Rush and also contains species such as Purple Moor-grass (*Molinia caerulea*), Birdsfoot (*Lotus corniculatus*), Silverweed (*Potentilla anserina*), Yellow Flag (*Iris pseudacorus*), False Oat-grass (*Arrhenatherum elatius*) (on tussocks), Red Clover (*Trifolium pratense*), Soft Rush (*Juncus effusus*), Compact Rush (*Juncus conglomeratus*), Jointed Rush (*J. articulatus*), False Fox Sedge (*Carex otrubae*), Sow-thistle sp. (*Sonchus* sp.), Purple Loosestrife (*Lythrum salicaria*), Yorkshire Fog (*Holcus lanatus*), Distant Sedge (*Carex distans*) and Mouse-ear (*Cerastium fontanum*). The appearance of these species indicates a decline in tidal inundation and greater influence of freshwater groundwater. Part of this area may have been dune slack in the past or there may be some vegetation succession from saltmarsh dune slack type vegetation as this site matures. Seaward of the old embankment there is extensive *Spartina* sward.

A narrow band of saltmarsh (ASM) continues further south along fixed dunes, south of a point on the dunes called Dromdarny. The ASM habitat gradually develops into pioneer saltmarsh vegetation as the substrate becomes sandier and is finally mapped as *Salicornia* flats. The saltmarsh habitat then disappears and a narrow beach alongside the sand dunes develops. *Spartina* swards are still distributed on the adjacent mudflats but these swards are less mature and more fragmented. There is a large area of mudflats with scattered clumps of Common Cordgrass is distributed at low densities.

The southern half of the sand dune system only has two small areas of Annex I saltmarsh development, both in low-lying features that protrude into the sand dunes. Both of these are dominated by MSM with landward transition to transitional wet grassland. Small patches of ASM are found on the seaward side of these small inlets that are generally drained by one main channel. Clumps of Common Cordgrass are still widely scattered on the adjacent mudflats and sand flats, with some development of *Spartina* sward in places. The sward in this area is actively spreading.

A small inlet at the tip of the sand dune complex contains a large area of pioneer saltmarsh dominated by *Salicornia* flats on sand. This low-lying area has developed due to the growth and expansion of the sand dune system at the southern end to form a small secondary spit that shelters this area.

**Table 3.1.** Area of saltmarsh habitats mapped at Inch.

EU Code	Habitat	Area (ha)
1310	<i>Salicornia</i> and other annuals colonizing mud and sand (1310)	1.241
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> )	9.483
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )	29.112
non-Annex	<i>Spartina</i> swards	43.354
	Total	83.190

\* 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 along the saltmarsh. Two small areas are located at the end of ASM saltmarsh where there was a break in the habitat. Both these patches are distributed on sandy sediment. The central patch (at Dromdarny) has developed south of a small cobble ridge that forms a natural barrier to the ASM distribution. They are typical of pioneer vegetation where lower marsh vegetation gradually transitions to pioneer vegetation dominated by Glasswort (*Salicornia* sp.). These patches also contain some Common Saltmarsh-grass (*Puccinellia maritima*) and Annual Sea-blite (*Suaeda maritima*). Clumps and seedlings of Common Cordgrass are also present and both these areas are located adjacent to *Spartina* sward lower down on the mudflats.

A large patch of this habitat has developed at the southern tip of the island. This patch has developed in isolation from other saltmarsh habitat in a low-lying sandy intertidal area

surrounded by dunes. The vegetation is dominated in part by Annual Sea-blite and this species has colonised pure sand. Other sections are dominated by Glasswort. The distribution of both species is discontinuous and there are patches with sparse or no cover in this section. Common Saltmarsh-grass was rare in this area and there was no Common Cordgrass. This area is likely to be quite dynamic and the extent of the habitat is likely to vary from year to year. There are small patches of embryonic dunes developing in this area. There were no signs of ASM development in this area.

A second rarer Annex I *Salicornia* flats community (*Sagino maritimae*-*Cochlearietum danicae*) (Ephemeral saltmarsh vegetation with *Sagina maritima*) was also recorded at this site. This community was recorded in a typical situation where ASM saltmarsh protruded along a narrow channel into a low-lying area in the dunes. This community was noted in the upper transitional area between the ASM and the adjacent fixed dune vegetation. It was moderate-heavily grazed by rabbits and sheep and had a low sward dominated by Red Fescue (*Festuca rubra*), Buck's-horn Plantain (*Plantago coronopus*) and some Sea Plantain (*Plantago maritima*). Clumps of Marram (*Ammophila arenaria*) are interspersed through this zone, which is quite narrow, only 0.5 m wide. Rabbit burrows are also present. This community is patchily distributed and is quite localised in appearance.

### **3.3 Atlantic salt meadows (H1330)**

The ASM habitat found at this site is separated into several discrete patches of habitat that are scattered along the whole of the saltmarsh. This increases the overall diversity of the habitat as the ASM has developed in different situations and in association with different saltmarsh habitats.

The largest area of ASM is found in the central section. Several zones are present. Upper marsh vegetation with Red Fescue, White Clover (*Trifolium repens*) and Creeping Bent (*Agrostis stolonifera*) both prominent is present in patches surrounded by MSM. Other species present include Sea Plantain, Saltmarsh Rush (*Juncus gerardii*), Sea Arrowgrass (*Triglochin maritimum*) and Autumn Hawkbit (*Leontodon autumnalis*). Further into the basin there is some extensive patches of mid marsh ASM vegetation, some of which form a mosaic with scattered clumps of Sea Rush (MSM). This mid marsh zone is dominated by Sea Plantain and Sea Pink (*Armeria maritima*) with patches dominated by Saltmarsh Rush. Red Fescue appears in some higher mounds. Other species present include Sea Aster (*Aster tripolium*), Creeping Bent, Sea Milkwort (*Glaux maritima*) and Sea Arrowgrass. The saltmarsh topography is well developed and there are frequent salt pans in this section. The natural drainage system has been modified by artificial drains that dissect this area.

ASM is also located in several small linear patches adjacent to the sand dunes and on a gentle-moderate gradient. These sections are typically zoned due to the gradient with the development of low, mid and upper zones. The mid zone is generally the best developed zone and is dominated by Red Fescue and Sea Plantain. This zone also contains the best

developed salt pans and a good example of these can be seen in the ASM found at the northern end of the site behind the embankment.

The ASM found outside the embankment in the central section also has a transitional zone from low marsh vegetation dominated by Common Saltmarsh-grass with Sea Pink, Sea Plantain, Glasswort and Annual Sea-blite to *Spartina* sward along a gentle gradient, where the cover of Common Cordgrass gradually increases in abundance (north of Dromdarny). Turf fucoids are also present. This patch of ASM gradually transitions to low marsh and pioneer ASM vegetation where the sward breaks up and scattered clumps of Common Saltmarsh-grass are colonising the sandier sediment with Glasswort, Annual Sea-blite and Sea Milkwort (south of Dromdarny). Small clumps of Common Cordgrass are actively recruiting in this area and seedlings are also present. There is further zonation to a small patch of *Salicornia* flats.

ASM saltmarsh also develops in some low-lying areas that extent into the dunes. These are characterised by narrow channels containing saltmarsh vegetation that are only 5-10 m wide and extend into a larger area of saltmarsh developed in a basin. The vegetation is dominated by Red Fescue, Sea Plantain and some Sea Pink and grazed to a low sward mainly by rabbits. The saltmarsh transitions to dune slack type vegetation where Sea Rush (*Juncus maritimus*) is found with Glaucous Sedge (*Carex flacca*) and Hairy Sedge (*Carex hirsuta*) and Mint (*Mentha aquatica*).

#### **3.4 Mediterranean salt meadows (H1410)**

The MSM forms the largest component of the Annex I habitats at this site. This habitat has formed a wide linear zone of dense sward dominated by Sea Rush in the northern section. This sward is notable as it stretches from the upper boundary to the lower boundary of the established marsh with no typical zonation and development of ASM communities at the seaward side. This zone is about 100 m wide and covers a gentle landward gradient. The relatively wide zone of MSM development means that zonation within this habitat is well-developed. The saltmarsh topography is also well developed in this section and there are frequent salt pans and natural drainage creeks in this unit. There are also small mounds present in places that increase the diversity of the zonation. While the vegetation overall is dominated by Sea Rush the abundance of grasses such as Red Fescue and Creeping Bentgrass include towards the upper boundary. Other species present at low cover values include Saltmarsh Rush, Sea Milkwort, Autumn Hawkbit, Sea Plantain, Spear-leaved Orache (*Atriplex prostrata*), Common Scurvy-grass (*Cochlearia officinalis*) and Sea Arrowgrass. Species such as Purple Moor-grass and Parsley Water-dropwort (*Oenanthe lachenalii*) begin to appear close to the upper boundary.

Species such as Common Saltmarsh-grass, Sea Aster and Greater Sea-spurrey (*Spergularia media*) all appear in the MSM towards the lower seaward boundary. Most of this boundary is adjacent to *Spartina* sward. However, there is one section that has not been colonised by

Common Cordgrass and Sea Rush is spreading into the mudflats along the base of an old saltmarsh cliff.

One notable feature of the MSM at this site is the relatively wide zone of transitional vegetation with a mixture of Sea Rush, Purple Moor-grass, Silverweed, Marsh Bedstraw (*Galium palustre*), Curled Dock (*Rumex crispus*), Twitch (*Elytrigia repens*), Ragged Robin (*Lychnis flos-cuculi*), Tall Fescue (*Festuca arundinacea*) and other terrestrial species along the landward boundary of the MSM. The upper boundary was difficult to map in places as there was a very subtle change from the MSM to the adjacent transitional grassland. This boundary was generally recorded by assessing the relative abundance of Sea Rush and other grasses. The upper boundary has also been modified by the presence of an old drain and low embankment that runs parallel to the saltmarsh.

The central section of the saltmarsh is notable for the development of a large more heterogeneous area of saltmarsh in a low-lying area protruding into the dunes. MSM forms a mosaic with ASM in this area. The structural diversity of this section is also increased by the appearance of Sea Club-Rush and Common Reed stands spreading into the MSM and probably reflecting freshwater influence. This area also has a narrow band of transitional vegetation along the upper MSM boundary with a mixture of Sea Rush and other terrestrial species. In this case there are elements of dune slack vegetation spreading into the Sea Rush vegetation at the most landward point of this saltmarsh.

There are several smaller patches of MSM in the smaller patches of established saltmarsh in the southern half of the sand dune system. These have a similar species assemblage and also show similar zonation with transition to transitional wet grassland along the upper boundary. These patches of saltmarsh are drained by one central drainage channel.

MSM also dominates the saltmarsh along the mainland saltmarsh. MSM is found along a seaward fringe with a saltmarsh cliff marking the lower boundary. There is some development of stands of Sea Club-rush and Common Reed (*Phragmites australis*) along drains and along the landward boundary in places. There are also transitions to transitional wet grassland along a landward gradient in places. Some of this grassland is dominated by Sea Rush with Brambles (*Rubus fruticosus*) growing on some tussocks.

### **3.5 Spartina swards**

This site is notable for the extensive development of dense *Spartina* swards on mudflats along the seaward side of the established saltmarsh. A large and probably the oldest area of sward is found in the northern section. This sward is between 60-200 m wide and forms a continuous dense band of sward alongside the saltmarsh. There is a distinctive boundary between the sward and the adjacent ASM and MSM that is marked by an old saltmarsh cliff, indicating that Common Cordgrass only colonised the mudflats and did not spread into the established saltmarsh. The northern part is adjacent to ASM vegetation whereas MSM forms the upper boundary further south. There is a narrow transitional zone where Sea Rush or



ASM species such as Common Saltmarsh-grass and Lax-flowered Sea Lavender are spreading into the landward side of the *Spartina* sward. However, there is no large-scale vegetation succession of *Spartina* swards to other saltmarsh communities. There are some scattered clumps at the seaward side of the dense *Spartina* sward.

The largest area of sward is adjacent to the central section of saltmarsh. The distribution of *Spartina* sward is discontinuous and there is a gap containing bare mudflats between this area and the area to the north. This central area is notable as it contains a much wider zone of scattered clumps on mudflats situated seaward of the denser sward. This zone of scattered clumps is 400 m wide in places. This area is also somewhat different as Common Cordgrass has spread into some of the adjacent established saltmarsh to form vegetation mosaics. It has spread into the saltmarsh area that has been modified by reclamation attempts. These reclamation works probably promoted the spread of Common Cordgrass into this area due to drainage, the creation of bare mudflat patches and the disturbance of vegetation.

The vegetation mosaic are similar to those seen along the transitional zone between ASM and *Spartina* sward with a mixture of Common Cordgrass, Common Saltmarsh-grass and some Sea Aster Sea Plantain, Glasswort and Lax-flowered Sea Lavender. This vegetation type is found along the creeks in places. One notable feature of this area is the development of mixed patches of Sea Rush and Common Cordgrass. This community is quite unusual and not frequently encountered during the SMP project.

The southern half of the saltmarsh is notable for the presence of several smaller patches of *Spartina* sward that are less consolidated compared to the sward further north. The sediment is also sandier and this is clearest close to the sand dunes where the sediment is pure sand. Some of the *Spartina* sward has developed adjacent to the sand dunes with no other established saltmarsh in the zone between the *Spartina* sward or scattered clumps and the sand dunes. There are frequent new small clumps in this zone indicating that Common Cordgrass is spreading. Some of the larger clumps are also being colonised by Common Saltmarsh-grass and Glasswort. The *Spartina* sward is spreading further south and there is a large area on the intertidal mudflats and sand flats with scattered isolated clumps of Common Cordgrass. These clumps are colonising mudflats that also are vegetated by Eelgrass beds (*Zostera marina*) and Eelgrass is also found in some of the unconsolidated *Spartina* sward, or bare patches of mud within the sward. A comparison of the 2000 and 2005 series aerial photos shows that some of the patches of *Spartina* sward in this southern section have consolidated and grown significantly during this period. There also has been some dieback of clumps in places.

#### **4 Impacts and Activities**

This site is affected by several impacts and activities (Table 4.1), with the main impacts being the spread of Common Cordgrass and grazing. The saltmarsh is relatively isolated from other damaging activities related to amenity use by the dunes and is therefore in much better condition compared to Rosbehy.

One of the main impacts is grazing (140). The overall grazing intensity is low on Inch spit and there is little extensive damage from grazing by sheep and cattle. Sheep seem to graze the spit as commonage and there are several more established fenced enclosures towards the northern end that also contain saltmarsh habitat and are grazed by cattle. The NPWS management plan indicates that the site is grazed by sheep in the summer and by cattle in the winter. There is some localised damage to the saltmarsh along the mainland, but this is only a small area relative to the overall site. The saltmarsh is also bisected by some tracks (501) in places. Some of these are created by sheep and cattle while there is a track along part of the upper saltmarsh along the spit that is used by vehicles (probably related to farming) accessing the tip. The site is also used by walkers (622) hiking around the spit but these are likely to have a very minor impact on the saltmarsh relative to the overall size of the site. Some wheel ruts (623) were also noted in the *Salicornia* flats vegetation mapped at the southern tip. Vehicles probably access this area by driving down the beach.

The other main impact is the spread of Common Cordgrass, an invasive species of saltmarsh (954). It is widely distributed in Castlemaine Harbour and is most abundant at this site. This is its most southerly limit along the western Irish shoreline and it is only found again in Clonikilty Bay, Co. Cork. It is not known when it was planted in Castlemaine Harbour although it is known from this area since the 1960's (Nairn 1986). The first AFF report (Goodwillie 1972) indicated that Common Cordgrass was spreading on the mudflats at this site and this is still the case. A comparison of the 2000 and 2005 series OSI aerial photos shows that some of the larger patches of *Spartina* sward consolidated and got bigger during this period. The *Spartina* sward is likely to be spreading at the expense of Eelgrass flats and Eelgrass was noted in some of the unconsolidated *Spartina* sward and around isolated clumps at several locations. There are numerous small clumps of Common Cordgrass in the mudflats and sandflats indicating that it is reproducing and recruiting successfully in recent times.

Common Cordgrass has also spread into established saltmarsh in the central area along the spit, creating mosaic of MSM, ASM and *Spartina* swards. Its presence is assessed as having a negative impact due to the development of these mosaic areas and areas of ASM or MSM with relatively high Common Cordgrass cover (20-40%). There are some patches with high cover of Common Cordgrass and it has colonised along creeks and in pans in this area. Outside of the embankment that formerly protected this area there is an unmodified transitional zone between *Spartina* sward and ASM along a gentle landward gradient. It has not spread significantly into much of the other established saltmarsh, although there are

several small areas of ASM/Spartina sward mosaic and small clumps may be found in ASM close to its lower boundary with Spartina swards and mudflat. It is also found associated with the pioneer ASM and Salicornia flats in the central area.

Common Cordgrass has the capacity to spread into more if the established lower zone ASM, especially in conjunction with heavy grazing damage. However, the fact that a significant portion of the ASM has developed on sandy substrate means that it may be less vulnerable to invasion by Common Cordgrass. Common Cordgrass also has the capacity to spread into any saltmarsh developing in the low-lying area at the southern tip, especially if pioneer saltmarsh begins to accumulate muddy sediment. The MSM is much less vulnerable to the spread of Common Cordgrass.

The saltmarsh at this site has been modified by reclamation works in the past. This is most clearly seen in the central section where attempts were made to enclose and drain a large area of saltmarsh that extends into the dunes in a low-lying area in the 19<sup>th</sup> century. There are two series of embankments at this location an outer embankment and a more complete inner embankment. The outer embankment is marked on the 2<sup>nd</sup> edition 6 inch map while the inner embankment postdates the drawing of this map. Ultimately this attempted reclamation was unsuccessful and the saltmarsh within the embankment still retains many natural features, although it is criss-crossed by drains. Embankments and drainage can also be seen in the saltmarsh at other locations, particularly at the northern end of the spit where there are several established enclosures. An old earth berm runs along the seaward side of the saltmarsh and divides the saltmarsh from the intertidal channel and the Spartina sward. Some large drains also run parallel to the landward boundary. These impacts are not assessed as they occurred outside the current monitoring period.

The saltmarsh along the sand dune system has not been significantly affected by erosion (900). Much of the established saltmarsh is protected from erosion by Spartina sward. There are saltmarsh cliffs along the seaward edge of the mainland saltmarsh. This area may be prone to erosion and there are more indicators of erosion towards the east as the saltmarsh habitat narrows and becomes a slim band. Accretion (910) is influencing minor growth of saltmarsh along the central section where there is pioneer ASM and Salicornia flats habitat. It has also influenced the growth of the spit at the southern end and lead to the development of the low-lying area where Salicornia flats vegetation is currently developing. An examination of the OSI 2<sup>nd</sup> 6inch map shows that the sand dune complex did not extend as far as this point at that time so there has been significant growth of the sand dune complex. There has been no significant growth or expansion of established saltmarsh during the current monitoring period.

One notable feature of this site is that it is quite dynamic and there has been considerable natural habitat succession (990). This is more evident at a large site like Inch. An examination of the OSI 2<sup>nd</sup> edition 6 inch map shows that the saltmarsh (or area covered by spring tides, which approximates to saltmarsh) was much more extensive when this map was

drawn. The landward boundary of the saltmarsh seems to have retreated seawards since this map was drawn and there has been development of wet grassland with dune slack elements along the upper boundary as well as a wide zone of transitional wet grassland with a mixture of some Sea Rush and terrestrial species such as Purple Moor-grass. This may be related to some extent to the development of extensive *Spartina* swards seaward of the saltmarsh, so that the saltmarsh as a whole (established saltmarsh and *Spartina* sward) has ‘moved’ seawards. Several large areas formerly covered by spring tides (and probably containing saltmarsh) now are completely covered by sand dunes, indicating natural geomorphological processes. These impacts are not assessed as the most significant change occurred prior to the current monitoring period, but these natural processes are likely to continue in the future. The impact of these natural processes are assessed as neutral.

Other processes such as the spread of MSM and ASM vegetation into the landward side of the *Spartina* sward were also present. However the extent of this transitional vegetation (5-10 m wide) is relatively minor compared to the overall size of the *Spartina* sward (50-100 m wide). The natural succession of *Spartina* sward to other mid marsh and upper marsh communities is quite slow.

Impacts and activities around the site include recreational use the beach on the other side of the dunes (620), dispersed habitation (403) and grazing and other agricultural practises (120, 140) on the improved grassland adjacent to the saltmarsh along the mainland. Aquaculture (200) is carried on the mudflats adjacent to Inch. These activities have little or no measurable impact on the saltmarsh habitats at Inch.

**Table 4.1.** Intensity of various activities on saltmarsh habitats at Inch.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1310	623	C	-1	0.25	Inside
1310	954	B	-1	0.2	Inside
1330	140	C	0	9.483	Inside
1330	501	C	0	0.5	Inside
1330	622	C	0	0.5	Inside
1330	900	C	0	0.2	Inside
1330	910	C	+1	0.4	Inside
1330	954	B	-1	3.0	Inside
1330	990	C	0	2.5	Inside
1410	140	C	0	29.012	Inside
1410	143	C	-1	0.1	Inside
1410	501	C	0	1.0	Inside
1410	622	C	0	0.5	Inside
1410	900	C	0	2.0	Inside
1410	954	B	-1	3.0	Inside
1410	990	C	0	7.5	Inside

<sup>1</sup> EU codes as per Interpretation Manual.

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

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

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

<sup>5</sup> 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. There was no detailed information available for this site.

Inch saltmarsh is a large site with several features of notable conservation interest. The most notable feature of the site is the relatively intact and natural succession of habitats from fixed dune to wet grassland to saltmarsh and then to mudflats along a seaward gradient. The saltmarsh forms a notable part of this larger coastal ecosystem. Due to the size of the site the saltmarsh is quite diverse and there are well developed examples of several different saltmarsh communities present at the site. A second rarer Annex I *Salicornia* flats subtype (*Sagino maritimae*-*Cochlearietum danicae*) (Ephemeral saltmarsh vegetation with *Sagina maritima*) has been recorded from this site. Turf fucoids are the only species of local distinctiveness recorded at this site and these are typical of saltmarsh found along the western coast of Ireland.

Overall the saltmarsh is in good condition. Grazing levels are generally low. The saltmarsh has been modified in the past by drainage and attempted reclamation to one section. These works have altered the structure of the saltmarsh. The spread of Common Cordgrass at this site is also significant and it should be noted that the total estimated area of *Spartina* sward is greater than the established Annex I saltmarsh habitats. The Common Cordgrass has mainly spread on the mudflats adjacent to the saltmarsh and therefore has not had a significant impact on the saltmarsh. However, it is present in some zones including pioneer ASM and *Salicornia* flats and this is the main reason for the overall conservation assessment as unfavourable-inadequate (Table 5.1). The extent of *Salicornia* flats is likely to be reduced by this species. *Spartina* swards are likely to continue to spread at this site and threaten the extent of Eelgrass beds and the conservation status of the mudflats at this site (although this habitat is not being assessed).

There is evidence to show that natural habitat succession is occurring at this site. Saltmarsh habitat may have been more extensive in the past but former areas covered by spring tides

are now sand dunes. Pioneer saltmarsh is present in a low-lying area near the tip of the sand dune system. This area is relatively young and has developed due to continued accretion of sand and growth of the sand dunes. This area may be a precursor to further development of established saltmarsh in the future and is an example of these natural dynamic processes that are important for a healthy coastal ecosystem. However the tip of Inch sand dune system is quite dynamic and it is not known how this area will change in the future.

The accretion and built of sand dunes and potential saltmarsh at the tip of the sand dune system can also be assessed as part of the larger coastal system of Castlemaine Harbour. Rosbehy sand spit on the opposite side of the bay is suffering from erosion and this is also affecting saltmarsh habitat. The status of saltmarsh habitat at both sites could be assessed as being somewhat in equilibrium with accretion affecting one site and erosion affecting the other.

This site is located within Castlemaine Harbour cSAC. An old format NPWS management plan is available for this cSAC but is now out of date.

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

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

## 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 are no indications of any loss of habitat due to land use changes, development or erosion within the current monitoring period. Common Cordgrass is found in this habitat but there is no evidence that it has spread during the current monitoring period to reduce the extent of this habitat, mainly due to the lack of accurate baseline data. This site contains a significant area of this habitat developing at the tip of the sand dune system.

### **5.2.2 Habitat structure and functions**

The structure and functions of this habitat area assessed as favourable. Three monitoring stops were carried out in this habitat and all three passed. All the attributes for the favourable status of this habitat reached their targets. The *Salicornia* flats form part of the wider saltmarsh zonation and form part of the pioneer vegetation at several locations. There are natural transitions to pioneer ASM along the upper boundary of the *Salicornia* flat zone.

There was some damage to the southern section of habitat from vehicle traffic and wheel ruts. Common Cordgrass is present in the two northern sections and as there is no baseline data, is not assessed as having spread significantly within the current monitoring period.

A second rarer Annex I *Salicornia* flats community (*Sagina maritima*-*Cochlearia danica*) (Ephemeral saltmarsh vegetation with *Sagina maritima*) was also recorded at this site. It was recorded in its typical situation along the sand dune/saltmarsh interface. The presence of this community was probably under-recorded as it is difficult to identify without detailed survey. This community increases the diversity of this habitat and the site as a whole. This community was previously recorded at this site (Wymer 1984).

### **5.2.3 Future prospects**

The future prospects of this habitat are assessed as unfavourable-bad. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. The main threat to this habitat is the presence of Common Cordgrass. This invasive species has the capacity to continue to spread and reduce the extent of this habitat. Both small areas located in the northern half of the site contain small clumps and seedlings of this species indicating that it is actively spreading. Common Cordgrass is not present in the patch of habitat found at the tip of the island. This area may naturally change in the long-term and develop other saltmarsh vegetation including ASM as the site naturally develops.

## **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 land use changes, development, or erosion within the current monitoring period. The overall extent of ASM may have been reduced naturally in the past 100 years due to natural habitat succession and geomorphological changes, including shifting sand. Common Cordgrass has spread into the saltmarsh and formed some mosaic but there is no evidence to suggest this occurred during the current monitoring period, mainly due to the lack of baseline data.

### **5.3.2 Habitat structure and functions**

The structure and functions of the ASM area assessed as favourable. Ten monitoring stops were carried out in this habitat and they all passed. All of the attributes required for

favourable conservation status of this habitat reached their targets. The ASM is in good condition and there are few damaging activities. The grazing intensity was generally low-moderate. Common Cordgrass, an invasive species, is present in this habitat but overall is not frequent and mainly confined to the Spartina sward. It is generally found at less than 5% cover with some increased cover in the central section where Spartina sward forms mosaics with the ASM. The impact of its spread on species composition is assessed as neutral.

The ASM diversity at this site is relatively high and there are well developed examples of all the major zones present. The zonation is well developed and the ASM is also part of a larger saltmarsh zonation with the other saltmarsh habitats such as MSM, Salicornia flats and Spartina sward. The ASM is also part of a larger coastal ecosystem and is found in association with fixed dune habitat. There are examples of natural transition zones of gentle gradients between Salicornia flats and ASM and also Spartina swards and ASM. The saltmarsh topography is well developed as would be expected from a large site such as Inch. There have been some modifications related to attempted reclamation in the 19<sup>th</sup> and 20<sup>th</sup> century.

### **5.3.3 Future prospects**

The future prospects of the ASM 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. The ASM is not being affected by any significant negatively impacting activities. Erosion is not a significant feature at this site. Common Cordgrass is the main threat to the ASM habitat. However, this species is not likely to spread significantly into the ASM in the future and only a portion of the ASM is vulnerable to this species. This includes the pioneer ASM vegetation. The upper and mid marsh zones are much less vulnerable to the spread of this species.

There is evidence of natural habitat succession at this site with saltmarsh habitat being replaced by sand dune habitats. These natural processes are likely to continue in the future. This is a sign of a healthy coastal system when natural changes of this scale are present. There has not been a corresponding accretion and growth of ASM saltmarsh in other parts of the site. The development of Salicornia flats at the southern tip of the sand dune system may be a precursor to the future development of ASM at this site.

## **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 land use changes, development, spread of Common Cordgrass or erosion within the current monitoring period. The overall extent of MSM may have been reduced natural in the past 100 years due to natural habitat succession and geomorphological changes, including shifting sand.



#### **5.4.2 Habitat structure and functions**

The structure and functions of the MSM habitat are assessed as favourable. Thirteen monitoring stops were carried out in this habitat and only one failed. Nearly all of the attributes required for the favourable conservation status of this habitat reached their targets. One stop failed due to heavy poaching levels. However the damaged area is quite minor compared to the overall extent of the MSM (< 1% overall) so the structure and functions are reassessed as favourable. The MSM is in good condition and is not being affected by any significantly damaging activities. The grazing intensity in the MSM is low. Some of the MSM could benefit from increased grazing levels as it was somewhat rank in places.

The MSM is quite structurally diverse at this site. Natural features such as salt pans and natural drainage channels are present within the MSM. The structure has been modified by attempted reclamation and drainage in the past. The species assemblage is typical of this habitat. One notable aspect is the presence of a relatively wide zone of transitional wet grassland along the upper boundary of the MSM due to the gentle gradient from the landward to the seaward saltmarsh boundaries. Some of the saltmarsh is quite heterogeneous with a mosaic of MSM, ASM and brackish marsh with stands of Common Reed and Sea Club-rush. Common Cordgrass has also spread into the MSM in places, particularly in the mid section. The impact of its spread on species composition is assessed as neutral. There is some minor spread of Sea Rush into the adjacent *Spartina* sward and mudflats at the lower seaward boundary.

#### **5.4.3 Future prospects**

The future prospects of the MSM are assessed as favourable. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. The MSM is not being affected by any significant negatively impacting activities. The grazing intensity overall is quite low. This habitat is not vulnerable to the significant colonisation by Common Cordgrass, which is present at this site, due to its location in the saltmarsh zonation towards the upper part of the saltmarsh and the fact that the sward is usually so dense.

### **6 Management Recommendations**

There are no specific recommendations 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.

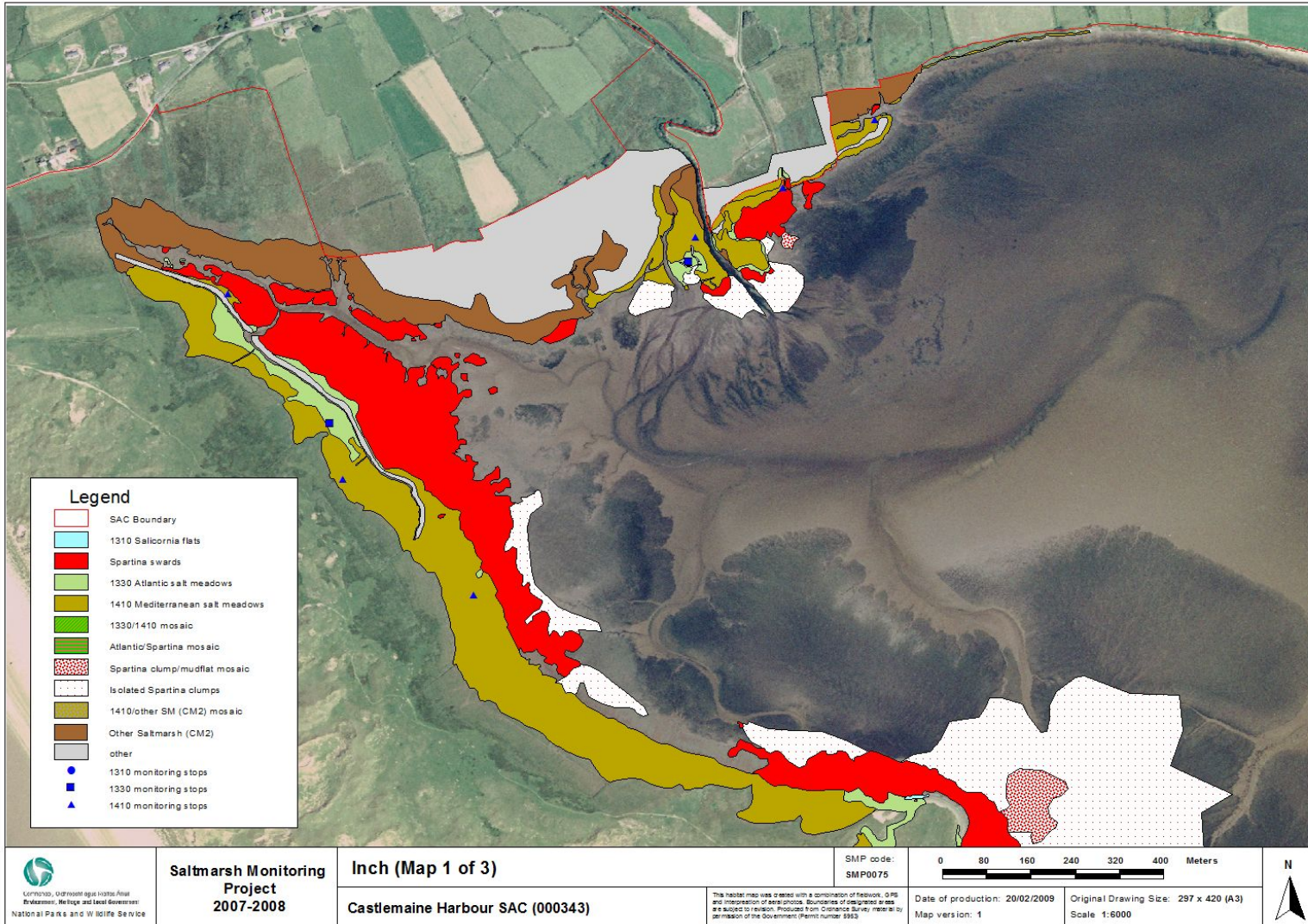
Goodwillie, R. (1972). A Preliminary Report on Areas of Scientific Interest in County Kerry. Dublin, An Foras Forbartha.

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

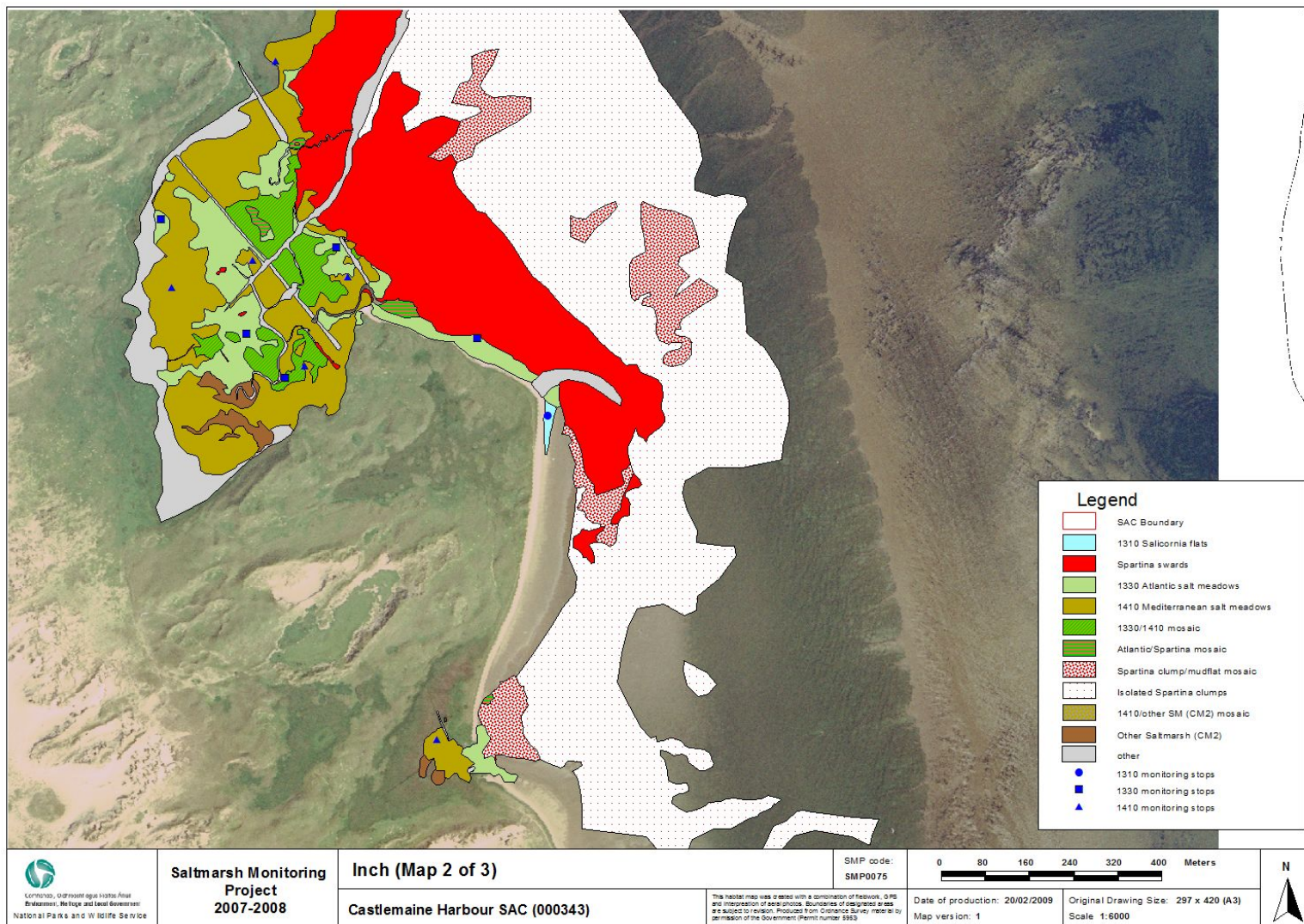
## 8 Appendix I

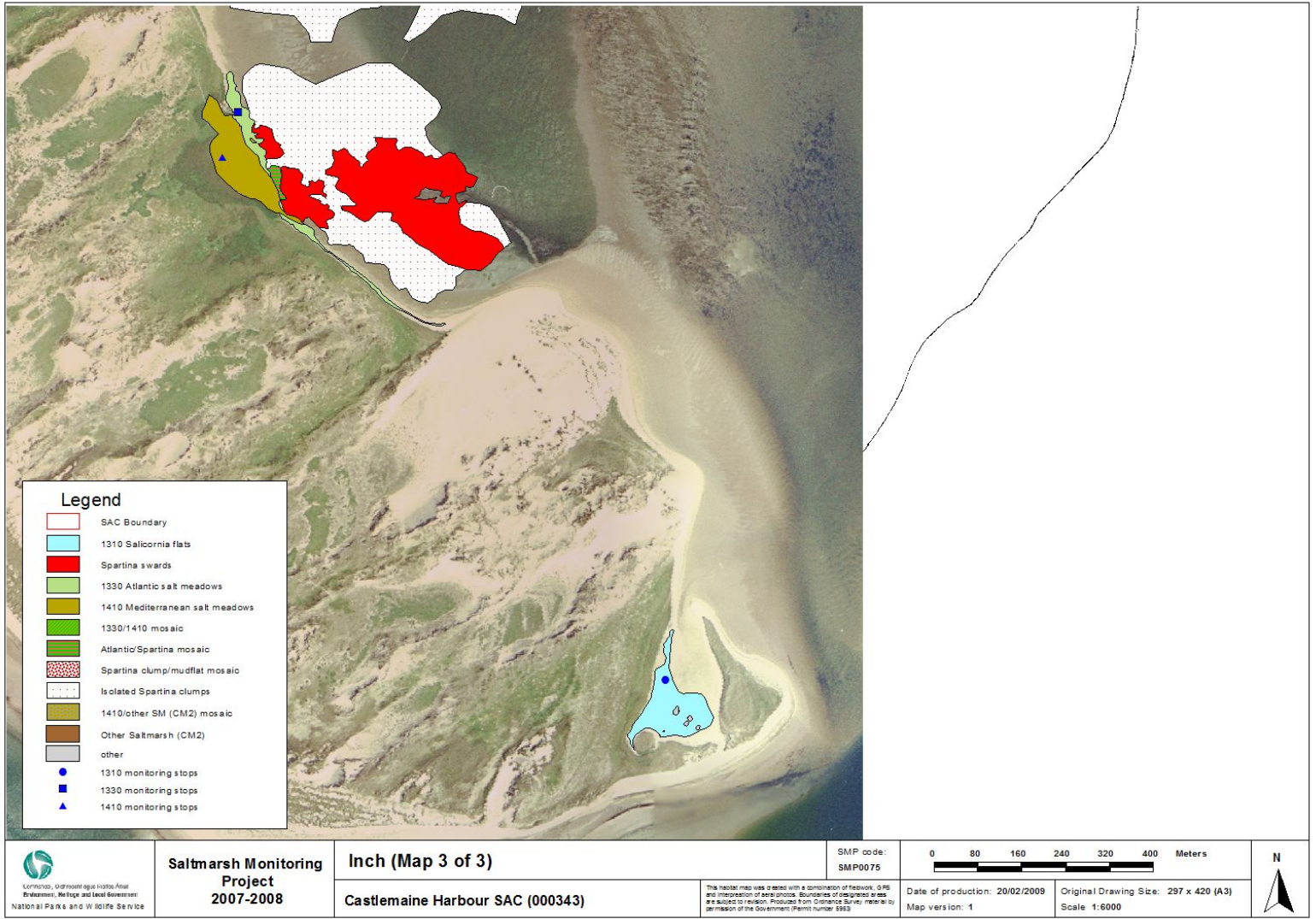
**Table 8.1.** Areas of SMP habitats mapped using GIS.

SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 Salicornia flats	1.241	1.241				
2	Spartina swards	36.552					36.552
3	1330 Atlantic salt meadow	7.87		7.87			
4	1410 Mediterranean salt meadow	27.701			27.701		
5	ASM/MSM mosaic (50/50)	2.813		1.406	1.4065		
6	ASM/Spartina mosaic	0.412		0.206			0.206
7	1330/other SM (CM2) mosaic						
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	14.99					
10	Spartina clump/mudflat mosaic (50/50)	6.671					3.336
11	Isolated Spartina clumps on mud (5%)	65.212					3.261
12	pioneer 1330/1310/Spartina mosaic						
13	1410/other SM (CM2) mosaic	0.009			0.005		
14	Spartina sward dominated, with some ASM						
15	1310/Spartina mosaic						
16	ASM dominated with some Spartina						
17	1330/sand dune mosaic						
18	Other SM (CM2)	7.412					
19	1330/rocky shore mosaic						
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	Total	170.883	1.241	9.483	29.112		43.354









## Appendix II – Rosbehy site report and habitat map from the Saltmarsh Monitoring Project (McCorry & Ryle, 2009).

### 1 SITE DETAILS

SMP site name: <b>Rosbehy</b>	SMP site code: <b>SMP0072</b>
Date of site visit <b>07/05/2008</b>	CMP site code: <b>68</b>
SM inventory site name: <b>Rosbehy</b>	SM inventory site code: <b>166</b>
NPWS Site Name: <b>Castlemaine Harbour</b>	
NPWS designation cSAC: <b>343</b>	MPSU Plan: <b>old format draft 2 plan available</b>
pNHA: <b>343</b>	SPA: <b>4029</b>
County: <b>Kerry</b>	Discovery Map: <b>78</b> Grid Ref: <b>064800, 091070</b>
Aerial photos (2000 series): <b>O 5986-C; O 6031-A,C,D; 6076-A</b>	6 inch Map No: <b>Ke 055, 063</b>
Annex I habitats currently listed as qualifying interests for Castlemaine Harbour cSAC:	
<b>H1310</b>	<b>Salicornia and other annuals colonizing mud and sand</b>
<b>H1330</b>	<b>Atlantic salt meadows (Glauco-Puccinellietalia maritimae)</b>
<b>H1410</b>	<b>Mediterranean salt meadows (Juncetalia maritimi)</b>
Other SMP sites within this SAC/NHA: <b>Cromane, Whitegate-Fybagh, Inch</b>	
Saltmarsh type: <b>Sandflats</b>	Substrate type: <b>Sand/mud</b>

### 2 SITE DESCRIPTION

Rosbehy saltmarsh is located in south-west Co. Kerry in Dingle Bay. The head of this bay is called Castlemaine Harbour and Rosbehy is a shingle and sand spit containing a sand dune complex that extends into the bay from southern shoreline, about 2.5 km from Glenbeigh. Rosbehy together with Inch sand spit, which extends from the northern shore, forms a natural barrier and shelters the shallower Castlemaine Harbour.

Rosbehy is an important amenity area and the sandy beach along the front of the sand spit is used by locals and by tourists in the area. The beach was awarded a Blue Flag in 2005, indicating that certain minimum standards of water quality and other criteria such as safety provisions and environmental objectives had been met. There is some amenity infrastructure at the neck of the spit including a playground and carpark. A Caravan park was also recently located in the adjacent dunes. The dune system was surveyed by the CMP project (Ryle *et al.* 2009).

The landscape of this area is dominated by upland habitats with very steep slopes along the shoreline that form cliffs further west of Rosbehy. This hillside is dominated by dry heath. Further east of the sand spit there is some low-lying land along the shoreline before the topography rises up steeply to the slopes of the adjacent steep hillside. This low-lying land was formerly reclaimed and an old berm is situated along the shoreline, which is now breached in places. Saltmarsh has developed in the sheltered area along the back of the



narrow spit and along the shoreline in front and also behind the old berm. The saltmarsh transitions to wet grassland and Reedbeds in the low-lying land along the shoreline. There is a wide expanse of intertidal sandflats and mudflats between the sand spit and the shoreline called Rosbehy Creek. The mudflats are found in the more sheltered inner section of the intertidal area where the spit is connected to the mainland. The river Behy flows into this sheltered intertidal area east of the spit and marks the limit of the survey site.

Rosbehy is part of Castlemaine Harbour cSAC (Site Code 000343). This cSAC covers most of the intertidal and sub-tidal parts of Castlemaine Harbour east of Rosbehy and Inch spits. The cSAC also includes the sand dune complexes at Inch and Rosbehy and the shingle spit at Cromane. The cSAC also includes some of the catchments of the Rivers Laune and Maine, which both flow into the head of the bay and forms the estuary of these rivers. Three Annex I saltmarsh habitats are found at this site, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). All three habitats are listed as qualifying interests for this SAC. *Spartina* swards are also found on the intertidal flats at this site, although this habitat is not now considered to qualify as an Annex I habitat.

Three other saltmarshes sites listed on the SM inventory (Curtis and Sheehy-Skeffington 1998) and located within this cSAC were surveyed during this project, Inch, Cromane and Whitegate-Fybagh. There is additional saltmarsh development in many of the small indentations along the shoreline, including significant areas of unsurveyed saltmarsh located between Cromane and the mouth of the River Laune.

Turf fucoids are the only species of local distinctiveness recorded at this site and these are typical of saltmarsh found along the western coast of Ireland.

Nearly all the saltmarsh habitat is found within the digital cSAC boundary. The entire saltmarsh habitat found on the sand spit is situated within the cSAC. The cSAC boundary then extends to the east and includes most of the saltmarsh habitat within the cSAC. However the outer berm is used as the cSAC boundary in one section and this excludes some saltmarsh habitat that has developed behind the berm.

The saltmarsh was easily accessed from the carpark at Rosbehy.

### **3 SALTMARSH HABITATS**

#### **3.1 General description**

This site can be divided into two main sections, the saltmarsh along the back of Rosbehy spit and saltmarsh that has developed along the mainland behind the old berm. These two sections are separated by an intertidal area called Rosbehy Creek.

##### **Saltmarsh along Rosbehy spit.**

This saltmarsh was dominated by ASM and also contained some MSM. This saltmarsh was in very bad condition, mainly due to heavy grazing pressure from sheep. There were also

small amounts of *Spartina* sward along the edge of the saltmarsh and on the adjacent intertidal flats. The saltmarsh has developed behind a shingle spit at the southern end. There is a natural transition from saltmarsh habitat to fixed dune habitat along a landward gradient. This transition has been modified and disturbed towards the southern end by infilling and the creation of the carpark and associated amenity infrastructure including a playground. The development of the football pitch also affected the structure of part of the transition area between the dunes and the saltmarsh. Further north the ASM saltmarsh is separated from the sand dunes by bare substrate created by vehicle use and the main track that accesses the northern end of the spit.

The upper boundary of the saltmarsh was difficult to map along this fixed dune grassland/saltmarsh transition in places, particularly around the football pitch. The upper boundary was undulating and indented in places where saltmarsh vegetation extended into shallow hollows between ridges with more typical fixed dune vegetation. The gentle gradient of the saltmarsh/sand dune topography has allowed a wide transitional zone to develop in parts of this site. There is a subtle transition between these habitats in places and the lower saltmarsh habitat frequently contains small mounds with fixed dune vegetation. Sea Rush (*Juncus maritimus*) also spreads into the adjacent fixed dune vegetation in places. Some of these patches dominated by Sea Rush along the upper boundary also contain fixed dune species such as Birdsfoot (*Lotus corniculatus*), Sand Sedge (*Carex arenaria*) Glaucous Sedge (*Carex flacca*) and increased Bryophyte cover.

The lower saltmarsh boundary is marked by a saltmarsh cliff 0.2-0.5 m high in the southern section with sand flats and mudflats adjacent to this boundary. Further north there is an accretion ridge marking the edge of the saltmarsh.

#### **Saltmarsh along the mainland.**

This saltmarsh has developed in land that was formerly reclaimed behind a berm. It is dominated by MSM with only a very small area of ASM. The reclamation was not successful and the berm was quickly breached, probably at some time in the 19<sup>th</sup> century as some of this land in the western section has been mapped as saltmarsh on the 2<sup>nd</sup> edition six inch map. This berm has been breached in several locations and this land has been allowed to revert back to saltmarsh as the berms have not been maintained. More land towards the east has reverted back to saltmarsh in the past 100 years. The western section is the oldest saltmarsh in this section.

This area is likely to have contained saltmarsh in the past before there were any attempts at reclamation. However it is not known if there is any of this relic saltmarsh left undamaged or unmodified by the attempted reclamation works. There are still signs of old drainage channels and creeks within this section that are likely to have been part of the original saltmarsh topography.



This saltmarsh is sub-divided into several sections by old field boundaries and associated channels. The field boundaries were built on embankments and acted as further sea protection in this low-lying area but tidal inundation still occurs through the drainage channels. There is less saltmarsh development behind the berm towards the east side of this section as the adjacent land is somewhat higher and out of reach of regular spring tides. This saltmarsh transitions at the landward side to brackish Reed beds and to wet grassland in the terrestrial areas. There are also patches of Common Reed (*Phragmites australis*) and Sea Club-rush (*Bolboschoenus maritimus*) extending up some of the artificial drainage channels. These stands have been classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. Parts of the eastern section are eroding, particularly along the seaward boundary, and there are wide channels containing mudflats between the saltmarsh and the old berm.

There are also some patches of saltmarsh located at the north-east corner that are outside the old berm. These patches of saltmarsh are old isolated hags of muddy substrate covered with a mosaic of ASM and MSM. They are showing signs of erosion and are surrounded by soft mudflats. It is not known if these patches are relic intact saltmarsh as the 1<sup>st</sup> edition OSI 6 inch map shows that these patches are located within a reclaimed area.

This low-lying area is vulnerable to flooding and a large area was flooded by exceptionally high winter spring tides in 2002, flooding some of the houses built along the Behy River channel at the eastern side. Local reports state that the flood water reached the road at Faha Lodge.

**Table 3.1.** Area of saltmarsh habitats mapped at Rosbehy.

EU Code	Habitat	Area (ha)
1310	<i>Salicornia</i> and other annuals colonizing mud and sand (1310)	0.002
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritima</i> )	7.286
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )	16.096
non-Annex	<i>Spartina</i> swards	0.147
	<b>Total</b>	<b>23.531</b>

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

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

There is only a very small amount of this habitat mapped at this site. The small patches of *Salicornia* flats were noted in the saltmarsh behind the berm along the shoreline. The *Salicornia* flats habitat is found on the eroding fringe of ASM along the channel behind the berm. Erosion has left some bare mud platforms that are being colonised by Glasswort (*Salicornia* spp.).

A second rarer Annex I *Salicornia flats* subtype (*Sagina maritima*-*Cochlearietum danicae*) (Ephemeral saltmarsh vegetation with *Sagina maritima*) has been recorded from this site in the past. This vegetation community is generally associated with the transition from

saltmarsh to sand-dune and has been recorded at several sites in Ireland (Wymer 1984, NPWS 2007b). This transition is usually very narrow (< 1 m wide but sometimes up to 5 m wide) and this plant community is associated with unstable substrate that is affected by erosion or accretion. However, it was not recorded during this survey. This community is likely to occur in the complex sand dune/saltmarsh interface around the foot pitch on the spit.

### **3.3 Atlantic salt meadows (H1330)**

The ASM is mainly found along Rosbehy spit. The ASM sward is in very bad condition, especially the northern section. This area is quite disturbed from overgrazing and frequent wheel-ruts. The heavy grazing has also affected the zonation of the northern section and the vegetation seems to be fairly uniform and dominated by a low-mid community. The saltmarsh has developed on sandy substrate and the main feature of the topography is the regular small mounds and small pan-like hollows over the surface of the saltmarsh. There is some zonation of the vegetation between these low mounds and hollows. There are few typical creeks in this saltmarsh.

Green algae cover and bare substrate cover is the dominant feature of the sward surface and the vegetation height is quite low. The main species in the ASM vegetation are Sea Pink (*Armeria maritima*), Sea Plantain (*Plantago maritima*) and Sea Milkwort (*Glaux maritima*) which are all widespread through the habitat but may occur at low frequencies. Other species present include Sea Aster (*Aster tripolium*), Common Saltmarsh-grass (*Puccinellia maritima*) and Buck's-horn Plantain (*Plantago coronopus*). Turf fucoids are found on bare exposed substrate near the lower boundary. Zonation is evident with some species like Saltmarsh Rush (*Juncus gerardii*) only appearing towards the upper section. Common Saltmarsh-grass is a more prominent feature of the vegetation along the seaward edge of the northern section, especially on the accretion ridge that marks the lower saltmarsh boundary. Glasswort and Annual Sea-blite (*Suaeda maritima*) is also found in this zone. Common Cordgrass (*Spartina anglica*) is present in this section but is very rare.

Further south, tussocks of Sea Rush begin to appear within the ASM. However, their overall frequency is low and only several sections with denser cover have been mapped as MSM. The ASM vegetation assemblage is similar and is dominated by mid marsh species. The southern section shows less damage from vehicle use but is still significantly overgrazed. There are also small mounds with more typical fixed dune grassland towards the upper saltmarsh boundary in places, which contain Sand sedge (*Carex arenaria*). There is some cliff toppling along the lower saltmarsh boundary in the southern section.

There is some ASM developed behind the old berm along the mainland. This ASM is found in the oldest section of saltmarsh. This area contains well-developed salt pans and creeks. The vegetation is dominated by a typical Sea Pink-Sea Plantain mid marsh sward and also contains frequent Common Saltmarsh-grass in places. This vegetation type also contains

occasional clumps of Sea Rush. There is some zonation related to subtle differences in the saltmarsh height with increased Sea Plantain and Saltmarsh Rush (*Juncus gerardii*) in places.

ASM is also found on the eroding hags of mud found at the north-east corner of the site. This vegetation is dominated by mid-upper saltmarsh with Sea Plantain and Red Fescue (*Festuca rubra*) prominent. There is also significant cover of green algae in sections. There are also occasional clumps of Sea Rush present and this habitat merges into ASM/MSM mosaic with some patches of MSM.

### **3.4 Mediterranean salt meadows (H1410)**

The MSM is present in both sections of the saltmarsh but is most developed in the saltmarsh along the shoreline. The MSM found along the spit shows frequent transitional indicators along the upper zone. The sward is dominated by Sea Rush and Red Fescue and also includes species such as Saltmarsh Rush, Creeping Bent (*Agrostis stolonifera*), Saltmarsh Rush, Sea Plantain and Autumn Hawkbit (*Leontodon autumnalis*). Sea Aster, Sea Pink, Common Scurvygrass (*Cochlearia officinalis*), White Clover (*Trifolium repens*), Spear-leaved Orache (*Atriplex prostrata*), Sea Milkwort and Lax-flowered Sea Lavender (*Limonium humile*) are also present in this vegetation but are rare. Glaucous Sedge is spreading into the MSM along the upper boundary with the fixed dune grassland. The saltmarsh topography is generally quite uniform with small hummocks and shallow hollows present. There are some small salt pans present but these are rare. There are also small mounds that contain more typical fixed dune grassland with Marram (*Ammophila arenaria*) in places.

The older MSM in the western part of the saltmarsh behind the berm is somewhat unusual as it contains a community with significant cover of Common Cordgrass spread within a mid marsh zone. Other species present this community includes frequent Sea Plantain. This community may have developed where both Sea Rush and Common Cordgrass where colonising bare mud in this area. This saltmarsh is generally quite flat and contains more typical saltmarsh pans. There are also some naturally occurring creeks. Further east there is some zonation of MSM where there is more typical grassy MSM towards the upper boundary and MSM with Sea Plantain towards the old berm. The grassy MSM contains frequent Red Fescue and Creeping Bent. The low-mid marsh MSM contains frequent cover of Sea Plantain, Sea Pink and some Common Saltmarsh-grass along with sparser cover of clumps of Sea Rush.

This habitat also contains some more brackish communities with a mixture of Saltmarsh Rush, Creeping Bent, Spike-rush (*Eleocharis uniglumis*) and Sea Rush. This vegetation also contains Brookweed (*Samolus valerandi*), Autumn Hawkbit and Sea Aster. This community is found towards the upper boundary of the saltmarsh in the north-east section. This area is quite brackish and there is some development of transitional vegetation due to less tidal influence.

### **3.5 *Spartina* swards**

*Spartina* swards do not form a significant portion of the saltmarsh habitat at this site. There are some large scattered clumps on the intertidal flats adjacent to the saltmarsh along the spit. These clumps have developed on a sandier substrate and the sand content of the intertidal flats in Rosbehy Creek increases towards the north. These flats are less suitable for the colonisation of Common Cordgrass compared to the mudflats found adjacent to the saltmarsh towards the more sheltered mainland. Further south clumps have coalesced to create a small narrow band of *Spartina* sward on the intertidal flats along the edge of the ASM. Clumps have also colonised the saltmarsh cliff to form a sward/ASM mosaic zone. There are generally very few clumps of Common Cordgrass on the adjacent ASM.

Common Cordgrass is more frequently found within the saltmarsh along the mainland shore and behind the berm. This area is likely to have contained more suitable conditions for colonisation of Common Cordgrass including bare soft mud substrate. However, there are no significantly large areas of Common Cordgrass in this area that could be mapped as *Spartina* sward. Small clumps are more frequently found scattered through the saltmarsh vegetation. An unusual community of Common Cordgrass and Sea Rush has developed in some sections.

## **4 IMPACTS AND ACTIVITIES**

This site is affected by a range of impacts and activities (Table 4.1). The main impact affecting the saltmarsh on the sand spit is grazing and the ASM saltmarsh is very badly overgrazed by sheep (142). This was some of the worst damage seen during the SMP survey around the country. The sand spit is grazed as commonage. There are frequent negative indicators present such as an extremely short sward and frequent cover of green algae on the surface. Poaching damage is also evident. The ASM vegetation assemblage also shows some dwarfing of saltmarsh plants. It should be noted that the upper saltmarsh and the adjacent fixed dune grassland seems to have plenty of foliage available at the time of the survey suggesting that the sheep are selectively grazing the saltmarsh to a greater extent than the fixed dune grassland. One reason for the extreme signs of overgrazing is the timing of the survey close to the start of the growing season within the saltmarsh habitat, so less foliage is typically present anyway. Another factor to be taken into account is that the substrate is based on sand and this type of saltmarsh is more vulnerable to overgrazing. The CMP site report (Ryle *et al.* 2009) indicated that under-grazing of the dunes was considered to be a problem at Rosbehy. However, rabbit grazing was considered to be high in places.

The saltmarsh along the shoreline between the spit and the River Behy is dominated by MSM and this habitat is much less intensively grazed compared to the saltmarsh on the spit. This section is divided into several enclosures and some of these fields have been improved in the recent past. Some of these fields are being grazed by horses.

The saltmarsh along the spit is also affected by amenity activities. There are several tracks (501) that pass through the saltmarsh habitat and are used by vehicles. The ASM saltmarsh is accessible to vehicles and there are frequent wheel ruts in some sections (623). There are pony trekking tracks across the saltmarsh and repeating trekking is damaging the sward surface and causing minor erosion in places (622). A caravan park was recently located on adjacent dunes close to the saltmarsh and the presence of this caravan park increased the recreational and vehicular pressure on the saltmarsh. However, no caravans were present at the time of the survey.

Part of the saltmarsh has been damaged by adjacent infilling during the current monitoring period as part of the new car-parking area (803). A house is also being constructed on infilled land behind the berm at the north-east corner of the site (within the SAC). This infilled area is likely to have contained some MSM habitat (about 0.15 ha).

Common Cordgrass is present at this site. This is an invasive species of saltmarsh and mudflats (954) and is widely distributed in Castlemaine Harbour. This is its most southerly limit along the western Irish shoreline and it is only found again in Clonakilty Bay, Co. Cork. It is not known when it was planted in Castlemaine Harbour although it is known from this area since the 1960's (Nairn 1986). Common Cordgrass is only very rarely found within the ASM vegetation. Its impact is assessed as neutral. It is more frequently found in the MSM vegetation found behind the old berm. Its impact at this location is assessed a negative as it has formed some mosaic areas. Clumps are found on the adjacent intertidal flats and forming some small patches of sward adjacent to the saltmarsh. The *Spartina* sward cover is quite low (< 1% cover) relative to the cover of ASM and MSM saltmarsh and the remaining intertidal mudflats. Several large clumps are present on the mudflats and there are no indications of any recent recruitment. There are no indications that it has spread significantly during the current monitoring period from the survey or from an examination of the aerial photos.

There are frequent signs of old coastal reclamation and land improvement along the shoreline between the sand spit and Behy River (802). The main feature is the old breached berm along the current shoreline. The land behind the berm is also drained by deep channels. Much of the land in the western section has reverted back to saltmarsh or was never reclaimed entirely. Land in the eastern section is somewhat higher and is now inundated by the tides significantly.

The first edition OSI six inch map shows that attempts were made to reclaim a large parcel of intertidal land in Rosbehy Creek behind an old seawall between the sand spit and the mainland at the mouth of the Behy River during the 19<sup>th</sup> century. The low-lying land along the shoreline is mapped as agricultural fields so it is not known if there is any relic saltmarsh in this area that has been left undisturbed from the attempts at reclamation. The remains of this old seawall are still present at the site. This attempted reclamation obviously failed and the current old berm is now marked on the 2<sup>nd</sup> edition OSI 6 inch map. The position of the current

berm changed between the drawing of the 1<sup>st</sup> and 2<sup>nd</sup> edition six inch map at the north-east corner, indicating probable breaches in this section during this time. These historical attempts at reclamation have had a very significant impact on the structure of the saltmarsh along this shoreline. These impacts are not assessed as they occurred prior to the current monitoring period but they are still having a significant residual impact.

Recently there has been some flooding in this area behind the old berm. Several houses adjacent to the north east part of the site were flooded and a lot of the adjacent wet grassland and improved grassland was also flooded. A secondary embankment has now been created to prevent further flooding of this area but this does not affect any saltmarsh habitat.

There are some signs of recent accretion (910) of saltmarsh along the sand spit at this site. There are signs of active accretion at the northern end of the saltmarsh with an accreting ridge down onto the intertidal sand flats. Further south a typical saltmarsh cliff develops indicating that growth is currently absent in this section. A comparison of the OSI 2<sup>nd</sup> edition 6 inch map to the OSI 2005 series aerial photos shows that there has been significant growth of fixed dune and saltmarsh (of up to 250 m in one section around the football pitch) into Rosbehy Creek during this period.

There are visible signs of erosion of saltmarsh at the north-east corner of the site where relic hags of saltmarsh vegetation are being eroded (900). Cliff toppling is present. These small saltmarsh hags were mapped on the 2<sup>nd</sup> edition 6 inch map but have got smaller since this map was drawn (in comparison with the current aerial photos). However, the actual loss of saltmarsh is quite low and of the order of about 0.1 ha within the past 100 years. The damage to the berm along the shoreline is also an indication of an erosional trend in this area. There also seems to be erosion of saltmarsh from behind the berm, possibly due to tidal scour. There are some wide sections of bare intertidal flats present where there was previously terrestrial land or saltmarsh marked on the 2<sup>nd</sup> edition 6 inch map. A saltmarsh cliff is also present along the southern section of the saltmarsh along Rosbehy spit with some cliff toppling. However, a comparison of the 1995, 2000 and 2005 OSI aerial photos series indicates shows that there has been no measurable loss of habitat during the current monitoring period. Erosion is assessed as having a low negative impact on this ASM. There are good prospects for retreat of saltmarsh in the area behind the embankment.

The main Impacts and activities around the site are related to farming and to amenity use of Rosbehy sand dunes and adjacent beach. Farming activities such as mowing/cutting (102), fertilization (120) and grazing (140) occur in some of the adjacent low-lying land along the coastline in the south-east corner of the site. However, farming is not intensive in this area. The Rosbehy spit, beach and dunes are used for activities such as swimming, walking, camping, horse-riding etc. The southern part of the spit has been significantly modified to develop the car-park and playground (600). Some of the adjacent dune grassland has been modified to create a football pitch (600). These impacts have already been assessed or facilities were developed before the current monitoring period. Some recent infilling in the

southern section of the spit has already been assessed. Other impacts around the area include dispersed habitation (403) and minor roads (502). These activities have little or no measurable impact on the saltmarsh habitats.

**Table 4.1.** Intensity of various activities on saltmarsh habitats at Rosbehy.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1330	142	A	-1	4.00	Inside
1330	501	C	-1	1.2	Inside
1330	622	C	-1	1.2	Inside
1330	623	B	-1	1.2	Inside
1330	900	C	-1	0.5	Inside
1330	910	C	+1	1.0	Inside
1330	954	C	0	0.001	Inside
1410	140	C	0	5.0	Inside
1410	501	C	0	0.5	Inside
1410	622	C	0	1.0	Inside
1410	954	B	-1	2.0	Inside

<sup>1</sup> EU codes as per Interpretation Manual.

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

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

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

<sup>5</sup> 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

### 5.3 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. There was no specific information available for this site.

Rosbehy saltmarsh is a moderate-large site with several features of notable conservation interest. These include the natural transition between the saltmarsh and fixed dune habitat. There is also a significant area of saltmarsh developing in previously reclaimed land behind the old berm along the shoreline. A second rarer Annex I *Salicornia flats* subtype (*Sagina maritima*-*Cochlearietum danicae*) (Ephemeral saltmarsh vegetation with *Sagina maritima*) has been recorded from this site in the past but was not recorded during this survey. A significant part of the transition zone between the sand dunes and the saltmarsh has been modified by a track and by the creation of a football pitch and other infrastructure. However,

this rare vegetation community is still likely to be present as there is suitable habitat still present. Turf fucoids are the only species of local distinctiveness recorded at this site and these are typical of saltmarsh found along the western coast of Ireland.

A significant part of the saltmarsh along Rosbehy spit is in very bad condition due to heavy grazing levels, vehicle activity and other amenity use. The overall conservation status of the site is assessed as *unfavourable-bad*. The overgrazing damage and the occurrence of negative indicators such as green algae cover was probably the worst seen during the SMP survey. The CMP report assessed the condition of three of five sand dune habitats as *unfavourable-inadequate* and one habitat assessed as *unfavourable-bad*. However, overgrazing was not considered to be a significant problem.

The recent erosion of Rosbehy dunes (December 2008) is not likely to directly affect the saltmarsh habitat but may have indirect impacts in the future. These may include changes in sedimentation patterns and changes in erosional and accretion trends affecting the saltmarsh. There has been some dynamic changes and growth of saltmarsh and sand dunes in one section of the spit during the past 100 years and this growth probably reflects adjustments after the failed reclamation of a large part of Rosbehy Creek and wider sedimentation patterns within Castlemaine Harbour including interactions with Inch.

This site is located within Castlemaine Harbour cSAC. An old format NPWS management plan is available for this cSAC but is now out of date.

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

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 - Bad
Mediterranean salt meadows (1410)	Extent Structure and functions, Future prospects			Favourable



## **5.4 *Salicornia* and other annuals colonizing mud and sand (H1310)**

### **5.4.1 *Extent***

The extent of this habitat is assessed as *favourable*. There are no indications of any loss of habitat due to land use changes, development or erosion within the current monitoring period. Only a very small area of this habitat was mapped at the site.

### **5.4.2 *Habitat structure and functions***

The structure and functions of this habitat are assessed as *favourable*. Due to the relatively small extent of habitat along the mainland no monitoring stops were recorded. However a visual assessment indicated that the *Salicornia* habitat was in good condition. No clumps of Common Cordgrass were noted in association with this habitat. The *Salicornia* flats habitat is poorly developed due to its relatively small size.

### **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 such as grazing continue in the near future. The habitat is not affected by any significantly damaging impacts or activities at present. Greater extent of *Salicornia* flats could have been expected at this site as there is suitable habitat towards the northern end of the saltmarsh where there is an accretion ridge.

## **5.5 Atlantic salt meadows (H1330)**

### **5.5.1 *Extent***

The extent of this habitat is assessed as *favourable*. There are no indications of any loss of habitat due to land use changes, spread of Common Cordgrass, development or erosion within the current monitoring period. There is an accretional trend acting on the saltmarsh at the northern end of the saltmarsh along the spit while there is an erosional trend acting on saltmarsh at the north-east corner of the site. However, there was no measurable loss or gain of saltmarsh during the current monitoring period.

### **5.5.2 *Habitat structure and functions***

The structure and functions of this habitat are assessed as *unfavourable-bad*. Eight monitoring stops were carried out in this habitat and seven failed. This is the worst result recorded during the SMP project and reflects the extensive damage to the ASM from high levels of overgrazing and poaching as well as wheel ruts and poaching from pony/horse trekking. There are frequent negative indicators present such as green algae cover, bare substrate cover and dwarfing of saltmarsh species. The excessive grazing has also affected the saltmarsh zonation and species assemblage of the ASM along the spit. The vegetation is dominated by a ubiquitous mid marsh sward but there is some zonation of species with Common Saltmarsh-grass found at the lower boundary and Saltmarsh Rush found at the upper boundary.

Rosbehy saltmarsh does contain some features of notable interest including natural transitions from fixed dune grassland to ASM saltmarsh and from ASM to MSM saltmarsh. Vehicle activity along the track has removed the transitional zone between ASM and fixed dune in one section. Common Cordgrass is present at this site but is only found very rarely in the ASM. The impact of its spread during the current monitoring period is assessed as neutral. There is also an accretion ridge along part of the lower ASM boundary.

### **5.5.3 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 such as grazing continue in the near future. The habitat is currently being significantly affected by overgrazing and vehicle damage. The un-licensed caravan park that was located adjacent to the ASM has been removed and this should have a positive impact on reducing the vehicle pressure on the saltmarsh habitat.

It should be noted that the CMP report on the conservation status of the sand dunes stated that the vegetation of the dunes was rank and dominated by Marram and stocking levels were too low. The NPWS Conservation management plan also states that Rosbehy dunes were ungrazed for many years and this affected the diversity of the dune grassland. The site is owned by Kerry County Council so grazing levels in general should be easily regulated. However, this problem was seen at several other sand dune complexes that are grazed as open commonage where sheep selectively overgraze the saltmarsh but the adjacent sand dunes may contain more abundant foliage. This issue needs careful consideration.

The site is also vulnerable to continuing erosion in the future. There is an erosional trend acting on the saltmarsh at the north-east corner and on some of the saltmarsh located behind the berm.

The ASM may be vulnerable to continued spread of Common Cordgrass due to the heavy grazing pressure and poaching, which creates suitable bare substrate for possible colonisation. However, this colonisation has occurred at a very slow rate in the past and is likely to continue in the future. Continued erosion may also create conditions suitable for the colonisation of Common Cordgrass.

## **5.6 Mediterranean salt meadows (H1410)**

### **5.6.1 Extent**

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

### **5.6.2 Habitat structure and functions**

The structure and functions of this habitat are assessed as *favourable*. Ten monitoring stops were carried out in this habitat and they all passed. All the attributes required for favourable conservation status reached their targets. The structure and functions of the MSM are in

generally good condition. There are few negative indicators. This habitat is not affected to the same extent as ASM to the heavy grazing levels and the sheep generally avoid the dense swards dominated by Sea Rush. Some sections of the MSM are locally damaged by poaching and overgrazing and there are patches of mosaic where the ASM surrounding the tussocks of MSM is grazed to a very low level.

The species assemblage of the MSM is typical of this vegetation type. There is some zonation of the MSM into different communities. The gentle gradients between the saltmarsh and sand dunes means that a relatively wide transitional zone containing features of both habitats is present along the upper MSM boundary on the sand spit. There is some transition from MSM to other saltmarsh vegetation dominated by Common Reed and wet grassland in the section located behind the old berm. The structure of the MSM habitat along the dunes is typical of this habitat. However the structure of the MSM found behind the old berm has been significantly modified by the attempted reclamation in the past.

Common Cordgrass is present within some of the MSM and has formed mosaic areas in places behind the berm where its cover is relatively high (20-40%). The impact of its spread is assessed as neutral as there is no evidence to suggest it has spread in this area during the current monitoring period, mainly due to the lack of accurate baseline data.

### **5.6.3 Future prospects**

The future prospects of this habitat are assessed as *favourable*. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. This habitat is not currently being affected by grazing or by the other negatively impacting activities to the same extent as the ASM. The MSM is also less vulnerable to erosion compared to the ASM, generally because most of the MSM is protected to some extent by the ASM or by the old berm. Erosion of the western section of saltmarsh along the shoreline may eventually threaten the extent of MSM in the long-term, but there are prospects for natural retreat of saltmarsh towards the east into the low-lying area containing wet grassland.

There is some MSM present behind the old berm that contains an unusual vegetation type with Sea Rush mixed with Common Cordgrass. This species is an invasive species. However, it is unlikely to continue to spread significantly in this vegetation to form dense swards of *Spartina* swards. The presence of this species is likely to be related to the development of saltmarsh and colonisation of bare mud in this area after the failed reclamation attempts. Continued erosion in the area behind the berm may increase the potential for the spread of *Spartina* sward at the expense of MSM.

## **6 MANAGEMENT RECOMMENDATIONS**

Kerry County Council should consider restricting vehicle access to the sand dune complex to reduced damage to the saltmarsh and the saltmarsh/sand dune interface.

## 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.

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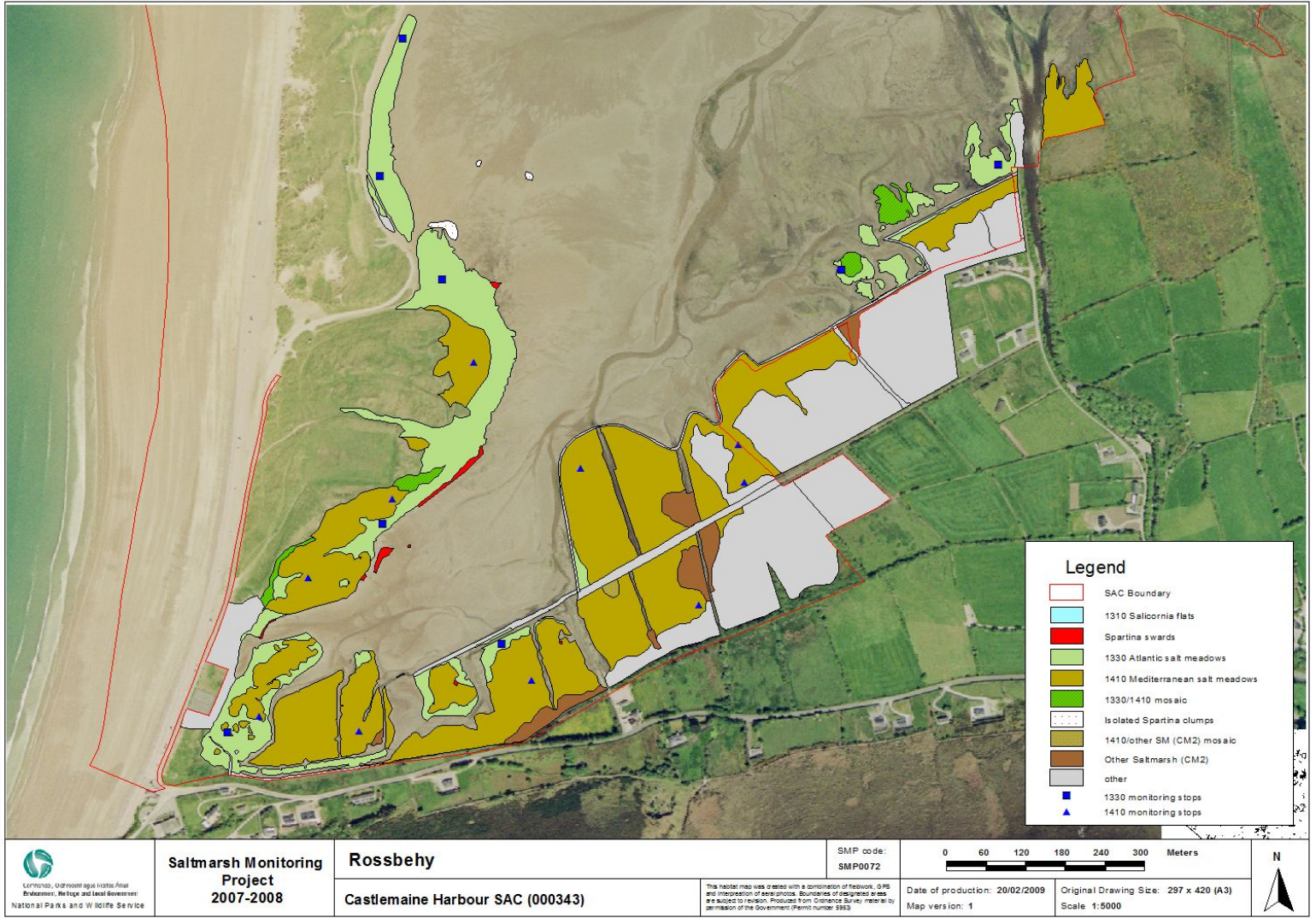
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## 8 APPENDIX I

**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	0.002	0.002				
2	Spartina swards	0.143					0.143
3	1330 Atlantic salt meadow	7.009		7.009			
4	1410 Mediterranean salt meadow	15.792			15.792		
5	ASM/MSM mosaic (50/50)	0.560		0.28	0.28		
6	ASM/ <i>Spartina</i> mosaic						
7	1330/other SM (CM2) mosaic						
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	12.131					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)						
11	Isolated <i>Spartina</i> clumps on mud (5%)	0.059					0.004
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic	0.047			0.02		
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)	1.134					
19	1330/rocky shore mosaic						
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	<b>Total</b>	<b>36.911</b>	<b>0.002</b>	<b>7.286</b>	<b>16.096</b>		<b>0.147</b>



## Appendix III – Cromane site report and habitat map from Saltmarsh Monitoring Project (McCorry & Ryle, 2009)

### 1 SITE DETAILS

SMP site name: <b>Cromane</b>	SMP site code: <b>SMP0073</b>
Dates of site visit <b>05-06/05/2008</b>	CMP site code: <b>N/A</b>
SM inventory site name: <b>Cromane</b>	SM inventory site code: <b>165</b>
NPWS Site Name: <b>Castlemaine Harbour</b>	
NPWS designation cSAC: <b>343</b>	MPSU Plan: <b>old format draft 2 plan available</b>
pNHA: <b>343</b>	SPA: <b>4029</b>
County: <b>Kerry</b>	Discovery Map: <b>71,78</b> Grid Ref: <b>070305, 097946</b>
Aerial photos (2000 series): <b>O 5868-C,D; O 5931-A,B,C,D; O 5932-C; O 5987-A,B; O 5988-A</b>	6 inch Map No: <b>Ke 056</b>
Annex I habitats currently listed as qualifying interests for Castlemaine Harbour cSAC:	
<b>H1310</b>	<b><i>Salicornia</i> and other annuals colonizing mud and sand</b>
<b>H1330</b>	<b>Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)</b>
<b>H1410</b>	<b>Mediterranean salt meadows (<i>Juncetalia maritimi</i>)</b>
Other SMP sites within this SAC/NHA: <b>Rosbehy, Whitegate-Fybagh, Inch</b>	
Saltmarsh type: <b>Estuary</b>	Substrate type: <b>Mud</b>

### 2 SITE DESCRIPTION

Cromane saltmarsh is located in Castlemaine Harbour in south-west Co. Kerry. Cromane is a shingle spit that extends into Castlemaine Harbour from the southern side of the estuary and is located 7.5 km west of Kilorglin Town. The spit is quite low-lying and has been converted to improved grassland. A shingle beach is found along the seaward side of the spit in places. There are extensive intertidal flats around the spit especially on the eastern side, and an estuarine channel flows around Cromane and south around Inch sand spit to the west. The mainland adjacent to the spit is quite low-lying and some of the adjacent land has been reclaimed and is protected by a berm. There is scattered habitation along the spit and also along the mainland shoreline. The tip of the spit is used by a mussel fishery.

Saltmarsh has developed in the sheltered low-lying intertidal area at the tip of the shingle spit and also in the sheltered area behind the spit and along the mainland shoreline. Much of the saltmarsh along the mainland is found on perched 'islands' of peat that have become separated from the mainland shoreline and are surrounded by intertidal mudflats. Saltmarsh with this type of structure is distributed from Cromane spit eastwards to the River Laune tidal river channel for about 7.5 km. Only the shoreline between Cromane Spit and a small inlet at Tullig was surveyed (about half this saltmarsh). Saltmarsh is also developing in one area behind a recently breached berm where Cromane Spit connects to the mainland.

Cromane is part of Castlemaine Harbour cSAC (Site Code 000343). This cSAC covers most of the intertidal and sub-tidal parts of Castlemaine Harbour east of Rosbehy and Inch spits. The cSAC also includes the sand dune complexes at Inch and Rosbehy and the shingle spit at Cromane. The cSAC also includes some of the catchments of the Rivers Laune and Maine, which both flow into the head of the bay and forms the estuary of these rivers. Three Annex I saltmarsh habitats are found at this site, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). All three habitats are listed as qualifying interests for this cSAC. *Spartina* swards are also found on the intertidal flats at this site, although this habitat is not now considered to qualify as an Annex I habitat.

Three other saltmarshes sites listed on the SM inventory (Curtis and Sheehy-Skeffington 1998) and located within this cSAC were surveyed during this project, Inch, Rosbehy and Whitegate-Fybagh. There is additional saltmarsh development in many of the small indentations along the shoreline, including a significant areas of unsurveyed saltmarsh located between Cromane and the mouth of the River Laune.

Turf fucoids are the only species of local distinctiveness recorded at this site and these are typical of saltmarsh found along the western coast of Ireland.

Nearly all the saltmarsh habitat is found within the digital cSAC boundary. The entire saltmarsh habitat found on the sand spit is situated within the cSAC. The cSAC boundary then extends to the east and includes most of the saltmarsh habitat within the cSAC. However the outer berm is used as the cSAC boundary in one section and this excludes some saltmarsh habitat that has developed behind the berm.

The saltmarsh habitats were accessed from several points along the shoreline, including the tip of Cromane spit and a small inlet at Tullig. Some of the intertidal mudflats between the shoreline and the saltmarsh islands are extremely soft and treacherous.

### **3 SALTMARSH HABITATS**

#### **3.1 General description**

This site can be split into two main sections, saltmarsh at the tip of Cromane Peninsula and saltmarsh along the mainland, including the back of Cromane Peninsula. Overall, Mediterranean salt meadows (MSM) has the greatest extent of habitat (Table 3.1).

The saltmarsh at the tip of the peninsula has developed in a low-lying intertidal area sheltered by shingle and cobble banks. These banks surround an intertidal area called Lough Commoge. Saltmarsh has developed on low-lying areas adjacent to the back of the shingle bank and along low-lying land adjacent to the rest of the peninsula. Some of these patches are 'islands' separated from the shingle bank by deep intertidal channels. Most of this saltmarsh is MSM, with some Atlantic salt meadow (ASM). There are also some patches of Common Reed on these islands on low mounds. There are small patches of *Spartina* sward

and isolated patches of Common Cordgrass (*Spartina anglica*) in the intertidal mud channels between the established saltmarsh. One significant feature of this saltmarsh is the drains across these fragments indicating previous land-use. There is also a low embankment and drain around the seaward side of the larger patches of saltmarsh. Some of the saltmarsh adjacent to the shingle bank has been infilled. A low berm divides this intertidal area from adjacent low-lying land on the peninsula. However, there is some development of saltmarsh behind the berm in one field where there has been a breach. A mosaic of *Spartina* sward and ASM is developing in this area and it also contains some waste material such as concrete and spoil.

The most significant feature of saltmarsh development along the mainland shore is the presence of saltmarsh on isolated islands, particularly towards the eastern side. Dense rank MSM is found on these relatively high islands that are perched on mud with steep saltmarsh cliffs 1(-2 m high) marking the seaward boundary. There is also significant development of other non-Annex I saltmarsh vegetation on these island including stands of Common Reed (*Phragmites australis*) and 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. There is a notable pattern to their distribution around the edges of some of these islands. There are also several patches of Twitch (*Elytrigia repens*)-dominated vegetation developing on some low mounds on these islands. This vegetation is also classified and mapped as CM2 or other Non-Annex saltmarsh vegetation in accordance with the SMP project classification. There is very little development of typical low marsh communities and zonation from low to upper marsh communities at this site.

Much of the saltmarsh along the western half of the mainland shore is joined to the mainland but is still quite fragmented into different sections of various sizes. This saltmarsh is a mosaic of ASM and MSM. The seaward boundary of this saltmarsh shows frequent indicators of erosion and a saltmarsh cliff marks much of the lower boundary with features such as slumping, eroded mud platforms, eroded hags of mud and runnels into the saltmarsh. Some of the saltmarsh has developed on a thinner layer of substrate overlaying cobble and shingle material and these sections are more vulnerable to erosion. There are frequent modifications to its structure, including drains and channels dug along the landward boundary, channels connecting to the seaward side and development of berms and low embankments of various heights and ages. Some berms are relatively new. This means that the landward transition of habitats has been significantly modified and there are few sections that have been left intact. There is some development of wet grassland adjacent to the saltmarsh in places and patches of Sea Club-rush and Common Reed appear in some of the landward channels.

The main feature of the saltmarsh at the neck of the spit is the newly developing saltmarsh in the low-lying area behind a breached berm. Some intact saltmarsh is still present on the landward side of the berm, but some of this saltmarsh has been modified by the use of mud from the saltmarsh to create the berm.



The low-lying area behind the berm is a mosaic of habitats and is still developing. This area was not mapped in detail due to this complex mosaic and the fact the soft intertidal mud in the channels was treacherous. Some of this land had been improved prior to the breach of the berm. The most extensive habitats include Common Reed beds along the southern side and a significant part of this area contains bare mudflats. The former structure of this area is still evident with old drainage channels (now mudflats) and old ditches with standing dead trees and hedges still present. There is some development of MSM along the inside of the berm. The northern section also contains some typical ASM vegetation developing on several low-lying fields. The western section is a very complex mosaic for newly developing saltmarsh communities, brackish Reedbeds and some relic terrestrial patches of wet grassland and improved grassland that is related to the topography in this area. This saltmarsh is still developing and some of the vegetation is typical of pioneer communities where other parts have more typical mid-high saltmarsh communities. Much of the vegetation is quite open and contains patches of bare mud. The saltmarsh structure is poorly developed and considerably modified due to the former reclamation and land-use in this area. A track marks a coarse upper boundary of saltmarsh development with some saltmarsh development in low-lying fields landward of the track. Most of the saltmarsh within this area does not qualify as ASM or MSM as the structure has been significantly modified and the vegetation communities are still developing.

**Table 3.1.** Area of saltmarsh habitats mapped at Cromane.

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )	13.907
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )	29.315
non-Annex	<i>Spartina</i> swards	1.007
	<b>Total</b>	<b>44.229</b>

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

### 3.2 Atlantic salt meadows (H1330)

The ASM at this site is best developed at the tip of the Cromane Peninsula. There is a rather large area of typical mid marsh saltmarsh with a vegetation community dominated by Sea Plantain (*Plantago maritima*) and Sea Pink (*Armeria maritima*). Other species present includes Common Saltmarsh-grass (*Puccinellia maritima*), Sea Arrowgrass (*Triglochin maritimum*), Lax-flowered Sea Lavender (*Limonium humile*) and Sea Aster (*Aster tripolium*). This area also contains frequent small shallow salt pans. There is some zonation to mid-upper marsh towards the shingle bank with increased cover of Saltmarsh Rush (*Juncus gerardii*) or Red Fescue (*Festuca rubra*) on low mounds. The mid upper zone also contains Common Scurvy-grass (*Cochlearia officinalis*) in addition to some of the species mentioned above. This area also contains some clumps of Common Cordgrass, generally in the salt pans are in the creeks or artificial drainage channels in this area. The former drainage of this area has left some of the saltmarsh vulnerable to colonisation by Common Cordgrass. This

ASM has a generally low sward height and is grazed by sheep. There are some signs of grazing damage in places. Turf fucoids are present in the heavier grazed ASM where low-mid substrate is being exposed.

There is some development of ASM along the mainland shoreline. This ASM is mainly dominated by mid-upper marsh communities. The sward height is variable along this shoreline. There are occasional fields where there is no protective berm and ASM saltmarsh extends into these fields. Some of the fields are heavily overgrazed and the species assemblage is affected by the grazing with Common Saltmarsh-grass (*Puccinellia maritima*) dominant in a zone where Red Fescue and Sea Plantain should be dominant. There are some examples of reverse zonation where ASM is found along the landward side of the MSM. This is mainly due to modifications caused by land reclamation and coastal protection. Some of the intact ASM towards the western side and along the back of the peninsula contains scattered clumps of Common Cordgrass, but most of the saltmarsh along this shoreline contains very little Common Cordgrass.

There is some natural unmodified transition of upper ASM along the upper boundary to a community dominated by Twitch and containing species like Sea Beet (*Beta maritima*) and Sea Mayweed (*Tripleurospermum maritimum*). This zonation is found along the sheltered side of the peninsula north of the breached section where there has been less disturbance.

There is generally very little development of low marsh communities at this site. This is because most of the seaward boundary is generally a saltmarsh cliff. However, there is some development of a sward dominated by Common Saltmarsh-grass along a moderate slope adjacent to the inside of the shingle bank at the tip of the peninsula. This community is also re-vegetating some of the shallower scrapes on the mudflats where material was removed to repair the berms. Common Cordgrass is also colonising these scrapes. Some pioneer and developing ASM vegetation is present in the area behind the berm. There are some almost pure swards of Common Saltmarsh-grass present in the area behind the berm and along the lane. Some of these swards are badly grazed.

### **3.3 Mediterranean salt meadows (H1410)**

Much of the MSM at this site is notable for being perched on 'islands' of saltmarsh isolated from the mainland shore. These islands are generally quite high and most of the saltmarsh vegetation is in an upper saltmarsh zone. The MSM is dominated by Sea Rush (*Juncus maritimus*) and is quite rank in places with a low diversity. These islands have not been grazed for some time. Other species found within this Sea Rush sward include Red Fescue, Creeping Bent-grass (*Agrostis stolonifera*), Spear-leaved Orache (*Atriplex prostrata*), Common Scurvy-grass (*Cochlearia officinalis*), Sea Aster (*Aster tripolium*) and Sea Plantain. Some sections are dominated by Red Fescue and Sea Rush is less abundant. Much of the MSM also contains some Common Reed and there are also transitions to stands of pure Common Reed. These islands have retained a well-developed saltmarsh topography in

places and there are frequent small salt pans and some mounds present. This influences the internal zonation of these areas with the distribution of some species obviously affected by the topography.

The MSM along the rest of the mainland has a similar species assemblage and structure with some sections containing abundant Red Fescue. There is some development of a mid-upper marsh zone in places with increased cover of Sea Plantain and less cover of Red Fescue. Some of the MSM is also grazed and these sections also contain patches of typical ASM vegetation with Sea Plantain, Sea Pink and Red Fescue. Some of the grassy ASM patches within the MSM are quite large. There is also some patches of lower marsh vegetation around some of the creeks with Sea Pink and Common Saltmarsh-grass prominent. Some of these patches are badly poached by cattle. The creek structure in much of this saltmarsh has been modified by the old drainage channels that dissect the saltmarsh. However salt pans are still present.

The MSM at the tip of the peninsula is dominated by upper marsh MSM with Sea Rush and Red Fescue prominent. This community also contains Creeping Bent-grass, Spear-leaved Orache and Common Scurvy-grass. There is some zonation along the seaward edges with the development of Sea Rush and a Sea Plantain-dominated sward. This community also contains Sea Pink and contains some sections with patches of Common Cordgrass within the artificial drainage channels and within the salt pans within this habitat. However the cover is less than 1%. The structure of this MSM has been significantly modified by drainage and cultivation in the past. The old drains are infilling and forming linear pan features. There are sections where the old drains have infilled and are vegetated with a mid marsh Sea Plantain-Sea Pink sward.

There are several small areas of MSM/ASM mosaic on the site. There are areas where there is typical mid or mid-upper ASM sward that also contains scattered clumps and large patches dominated by Sea Rush at various densities. The MSM community in these mosaic areas is dominated by Sea Rush and Sea Plantain.

MSM found adjacent to the berm at the neck of the Cromane Peninsula is immature with a sward dominated by clumps of Sea Rush on mud also containing patches of bare mud that have not been colonised. Other species present include Common Saltmarsh-grass and Sea Aster.

### **3.4 *Spartina* swards**

*Spartina* swards are not well-developed at this site. There are fragmented patches of *Spartina* swards developing on the intertidal mudflats along the berm and within the channels between these fragmented saltmarsh islands. These patches of sward have developed where large clumps have coalesced. The pattern of these large clumps is still visible. One notable feature is that there has been no significant recruitment recently of new clumps in this area and there are very few small clumps present. There is no significant development of

transitional zones between the established saltmarsh and the *Spartina* sward at the eastern end of the site because of the significant height difference.

There are some new small clumps of Common Cordgrass developing on the newly formed intertidal area behind the breached berm at the neck of the Cromane Peninsula but overall it is rare (< 1%). Common Cordgrass has the capacity to spread in this area and create more significant patches of *Spartina* swards, probably in mosaic with other habitats.

#### **4 IMPACTS AND ACTIVITIES**

The saltmarsh at this site is affected by a range of impacts and activities (Table 4.1). These impacts and activities reflect the fact that the saltmarsh and shoreline is much more accessible compared to other sites in Castlemaine Harbour. Erosion and activities to protect adjacent land (coastal protection) are some of the main activities affecting the saltmarsh at this site.

Grazing is not a widespread activity at this site (140). Much of the saltmarsh, particularly on the isolated islands of saltmarsh, is not grazed anymore, although they were grazed historically. Some of the islands also used to have the Rushes and Reeds cut for bedding and thatch in the past. A local landowner states that the extent of Common Reed seems to be increasing on these islands due to the lack of grazing and other disturbance (149). Saltmarsh at the tip of the peninsula is grazed by sheep. Cattle graze some sections along the mainland shore. Some of the saltmarsh is located in fields behind field boundaries and berms on the shoreline and some of this saltmarsh is grazed to various degrees. Some of the saltmarsh is badly damaged by localised overgrazing in some of these fields (143).

Erosion (900) is one of the main impacts affecting this site. Indicators of erosion can be seen all along the saltmarsh and the berms along the mainland shoreline including a large area of developing saltmarsh and brackish marsh in an area behind a breached berm. The saltmarsh within the partly enclosed shingle banks at the tip of the peninsula is not significantly eroded. The saltmarsh along the seaward boundary is fragmenting in places and also contains a high saltmarsh cliff 0.5-1 m high in places. Slumping and eroded mud platforms along the seaward boundary are quite frequent and isolated eroded peat hags are also present. Eroded runnels extend into the saltmarsh. A comparison of the OSI 2<sup>nd</sup> edition six inch map to the current 2005 aerial photo series shows that there has been some measurable loss of saltmarsh habitat during this period. This represents a loss of 5-10 m of saltmarsh in places and some small islands of saltmarsh along the shoreline have been completely eroded away. However, the shape of some of these islands has also remained intact during this period so erosion has not been very significant. The loss of saltmarsh is likely to be < 0.5 ha in the past 100 years, mainly MSM. However, there has been no measurable erosion during the current monitoring period. Erosion is assessed as having a negative impact on the saltmarsh at this site. There are poor prospects for retreat of saltmarsh at this site (apart from in the area

behind the embankment) so the impact of erosion is assessed as having an irreparable influence.

There has been some infilling at the tip of the spit (803). This is mainly related to maintaining the access road to the mussel fishery, which is located on a narrow shingle bank that is vulnerable to erosion. Infilling (803) and dumping of construction waste has occurred along both sides of the shingle bank and on the saltmarsh to reinforce this access road. There is also likely to be a waste disposal element to this dumping of material (422). This destroyed a relatively minor area of saltmarsh at the tip of the spit. Dumping of all sorts of material is a common feature around the site, especially along the shoreline and berms vulnerable to erosion. This material is mainly construction and demolition waste but also includes industrial waste such as car batteries. This material is being used as coastal protection to reinforce these berms in places. There was frequent dumping of material along the access track at the neck of the peninsula. This has not destroyed a significant area of saltmarsh but is a negative impact. Some of the developing saltmarsh in the area behind the berms contains frequent waste material.

Established saltmarsh has also been used to supply material for berm repairs. This activity has left channels and pits with bare mud within the saltmarsh at the western end near the neck of the spit (870). The berms at the eastern side of the survey site are maintained by OPW whereas private land-owners are attempting to repair the berms at the western end where there have been breaches. Erosion is also uncovering some of the old material used to build the berms such as old car wrecks. Some saltmarsh developing behind berms at the tip of the spit is likely to be destroyed in the future when the berms are repaired and the tidal influence is excluded again.

A small area of mudflats at the eastern side of the site has also been poldered (801) and infilled and used for housing development in the past 5 years. However, this infilling has not destroyed any saltmarsh.

The shoreline along the survey site has been significantly modified in the past due to historical reclamation. Some of the saltmarsh at the tip has been used for cultivation and was drained and old lazy beds are still evident in the topography of this area. Tall berms were built to protect low-lying land at the tip of the spit, the neck of the spit and at the eastern end of the survey site at Tullig. Smaller embankments are also found along the remaining sections of shoreline, sometimes on the seaward side of the saltmarsh. Some of these berms were built in the 19<sup>th</sup> century and have been subsequently been strengthened and extended during the 20<sup>th</sup> century. These berms have mainly been built along the upper saltmarsh boundary. However, saltmarsh was enclosed by the construction of these berms at the eastern and western ends of the site on the mainland (801).

The largest section of former reclamation was enclosed at the neck of the peninsula and this is the area where the berm has been breached and saltmarsh is now re-developing. This berm was repaired in 2002 but was breached again soon after. There are several breaches

now present. Improved grassland that was reseeded after the berm was repaired has now partially reverted to intertidal communities. This area contains a mosaic of habitats and one notable feature is the presence of standing dead trees and hedgerows along some of the field boundaries in this area. This is an example of unmanaged retreat of saltmarsh.

Common Cordgrass is present at this site and this is an invasive species of saltmarsh and mudflats (954). This is an invasive species (954) and is widely distributed in Castlemaine Harbour. This is its most southerly limit along the western Irish shoreline and it is only found again in Clonakilty Bay, Co. Cork. It is not known when it was planted in Castlemaine Harbour although it is known from this area since the 1960's (Nairn 1986). The first ASI report (Goodwillie 1972) noted that Common Cordgrass was not found at Cromane at that time (probably the saltmarsh at the spit). It is now found at the tip of the spit and is scattered along the shoreline, forming some patches of *Spartina* sward in the intertidal channels situated amongst the various saltmarsh islands to the east of the survey site.

**Table 4.1.** Intensity of various activities on saltmarsh habitats at Cromane.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1330	140	C	0	10.0	Inside
1330	143	B	-1	2.0	Inside
1330	422	B	-1	1.0	Inside
1330	803	A	-2	0.05	Inside
1330	870	A	-2	0.3	Inside
1330	900	B	-2	2.0	Inside
1330	954	C	0	2.0	Inside
1410	140	C	0	4.0	Inside
1410	149	C	0	7.5	Inside
1410	422	B	-1	2.0	Inside
1410	870	A	-2	0.3	Inside
1410	900	B	-2	3.0	Inside

<sup>1</sup> EU codes as per Interpretation Manual.

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

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

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

<sup>5</sup> 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.

Common Cordgrass has not significantly colonised the established saltmarsh and its overall cover on the saltmarsh is quite low (< 1%). The impact of its presence is assessed as neutral. Its current extent is quite low compared to Inch and is also still quite low compared to the extent of the established saltmarsh. Most of the clumps on the mudflats are quite large and there is little active recruitment of new small clumps like that seen at Inch. The established saltmarsh is not vulnerable to the invasion of Common Cordgrass as most of the

habitat is perched at a relatively high level on the shoreline in upper marsh zones. The newly formed intertidal area behind the berm is vulnerable to invasion by this species.

The main Impacts and activities around the site are related to farming (102, 120, 140) and shellfish harvesting (210) and aquaculture (200). There is also scattered habitation around the site (403) and several tracks (501) that are used to access the shoreline and facilitate dumping. Some houses are on low-lying land behind berms adjacent to saltmarsh and land-owners are taking measures to repair and reinforce these berms with impacts already listed. These impacts and activities are having little or no measurable impact on the saltmarsh habitats.

## **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. There was no detailed information available for this site.

Cromane saltmarsh is moderate-large site with several features of conservation interest. These include the unusual structure of some of the saltmarsh isolated on 'islands' along the mainland shoreline. The overall conservation status of this site is *unfavourable-bad*. This is mainly due to negatively impacting activities to the saltmarsh that are related to coastal protection. There is a significant erosional trend acting on the saltmarsh and shoreline of this site and this means that the saltmarsh will continue to be vulnerable both by erosion and from damage caused by coastal protection to protection farmland and dwellings built on low-lying land behind berms. There have also been significant modifications to the saltmarsh structure in the past, related to land reclamation and coastal protection. Common Cordgrass is present at this site and while it is not extensive, it has the potential to increase its cover significantly on the mudflats along this saltmarsh. The breach of a berm at the neck of the peninsula has led to new saltmarsh developing in a formerly reclaimed area. This is a positive feature but this habitat development is vulnerable to repairs to the berm to exclude the tide in the future.

This site is located within Castlemaine Harbour SAC. An old format NPWS management plan is available for this SAC but is now out of date.

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

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 – Bad
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 *unfavourable-inadequate*. There have been some minor losses of habitat due to infilling at the tip of the peninsula. Some saltmarsh has also been destroyed by the use of material from the saltmarsh to repair some of the berms. These losses are about 2-3% of the total ASM saltmarsh at this site.

There are indications of a natural erosional trend at this site. However, there has been no significant loss of saltmarsh at this site due to erosion during the current monitoring period. The breach of berm at the neck of the peninsula has meant that some new ASM is now developing in previously reclaimed land. This is a positive feature.

### 5.2.2 Habitat structure and functions

The structure and functions of this habitat area assessed as *unfavourable-inadequate*. Twelve monitoring stops were carried out in this habitat and four stops failed (25%). Most of the attributes required for favourable conservation status reached their targets. A significant part of the ASM saltmarsh is being damaged by a range of impacts and activities, including overgrazing, erosion and dumping of material used for coastal protection. Overgrazing on its own only affects a small area. Common Cordgrass is present at this site but is not a significant feature of the ASM vegetation. The impact of its spread on species composition is assessed as neutral.

There is a range of typical ASM saltmarsh communities at this site. Some small patches of habitat are relatively undisturbed and contain typical examples of zonation and also saltmarsh topography with natural creeks and pans. However, the saltmarsh structure has been largely modified by a range of activities in the past including drainage and cultivation at the tip of the peninsula and land reclamation and coastal protection along the mainland shore. These latter activities have modified much of the upper saltmarsh boundary and there are few intact examples of transition from upper ASM communities to brackish habitat or other vegetation left.



The structure and function of the ASM developing behind the berm is poor. Much of this saltmarsh is poorly developed as it is so young and there are a range of pioneer communities present.

### **5.2.3 Future prospects**

The future prospects of this habitat are assessed as *unfavourable-bad*. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. The ASM is likely to continue to be damaged by a range of activities related to coastal protection such as dumping of material along the shoreline and infilling. Other activities such as the use of saltmarsh material to repair berms destroys habitat and leaves the remaining disturbed habitat vulnerable to the spread of Common Cordgrass.

There is also an erosional trend at this site that in the long-term threatens the extent of ASM saltmarsh as there is little opportunity for the retreat of saltmarsh. The extent of ASM may be lowered in the future if some berms are repaired and the tidal influence to developing saltmarsh behind berms is excluded. Alternatively if these berms are not repaired then there is an opportunity for development of new ASM saltmarsh.

## **5.3 Mediterranean salt meadows (H1410)**

### **5.3.1 Extent**

The extent of this habitat is assessed as *favourable*. There has been no significant loss of habitat due to land use changes, development or erosion within the current monitoring period. Some saltmarsh has also been destroyed by the use of material from the saltmarsh to repair some of the berms. These losses are about 1% of the total MSM saltmarsh at this site.

There are indications of a natural erosional trend at this site. There has been some measurable loss of MSM saltmarsh from erosion in the past 100 years. However, there has been no significant loss of saltmarsh at this site due to erosion during the current monitoring period. The breach of berm at the neck of the peninsula has meant that some new MSM is now developing in previously reclaimed land. This is a positive feature.

### **5.3.2 Habitat structure and functions**

The structure and functions of this habitat are assessed as *favourable*. Sixteen monitoring stops were carried out in this habitat and they all passed. All the attributes required for favourable conservation status reached their targets. The structure and functions of the MSM are in generally good condition. There are some negative indicators but fewer than in the ASM. Some sections of the MSM are locally damaged by poaching and overgrazing but these are relatively minor. Some of the MSM is also affected by activities related to coastal protection such as dumping on the habitat and the use of saltmarsh material to repair the berms.

The species assemblage of the MSM is typical of this vegetation type. A significant portion of the MSM is isolated on islands from damaging activities. There is some zonation of the MSM into different communities. There is some transition from MSM to other saltmarsh vegetation dominated by Common Reed on the isolated islands. This MSM is quite rank and may be suffering from a lack of grazing with Common Reed spreading in the MSM. However, this is considered to be relatively minor and is not assessed as a significantly negative impact. Some of the MSM has retained its natural topological features and saltmarsh structure but a large part of the saltmarsh structure has been modified in the past, mainly related to drainage and coastal protection. There are few intact examples of transition from upper MSM communities to brackish habitat or other vegetation left along the mainland.

The structure and function of the MSM developing behind the berm is poor. Much of this saltmarsh is poorly developed as it is so young and there are a range of pioneer communities present.

### **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. Some of the MSM is likely to continue to be damaged by a range of activities related to coastal protection such as dumping of material along the shoreline and infilling. Other activities such as the use of saltmarsh material to repair berms destroys habitat and leaves the remaining disturbed habitat vulnerable to the spread of Common Cordgrass. However a significant portion of the MSM is isolated on islands from any significantly damaging activities. The relative height of these islands protects them from colonisation by Common Cordgrass.

There is also an erosional trend at this site that in the long-term threatens the extent of MSM saltmarsh as there is little opportunity for the retreat of saltmarsh. The extent of MSM may be lowered in the future if some berms are repaired and the tidal influence to developing saltmarsh behind berms is excluded. Alternatively if these berms are not repaired then there is an opportunity for development of new MSM saltmarsh.

## **6 MANAGEMENT RECOMMENDATIONS**

There are no specific management recommendations 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.

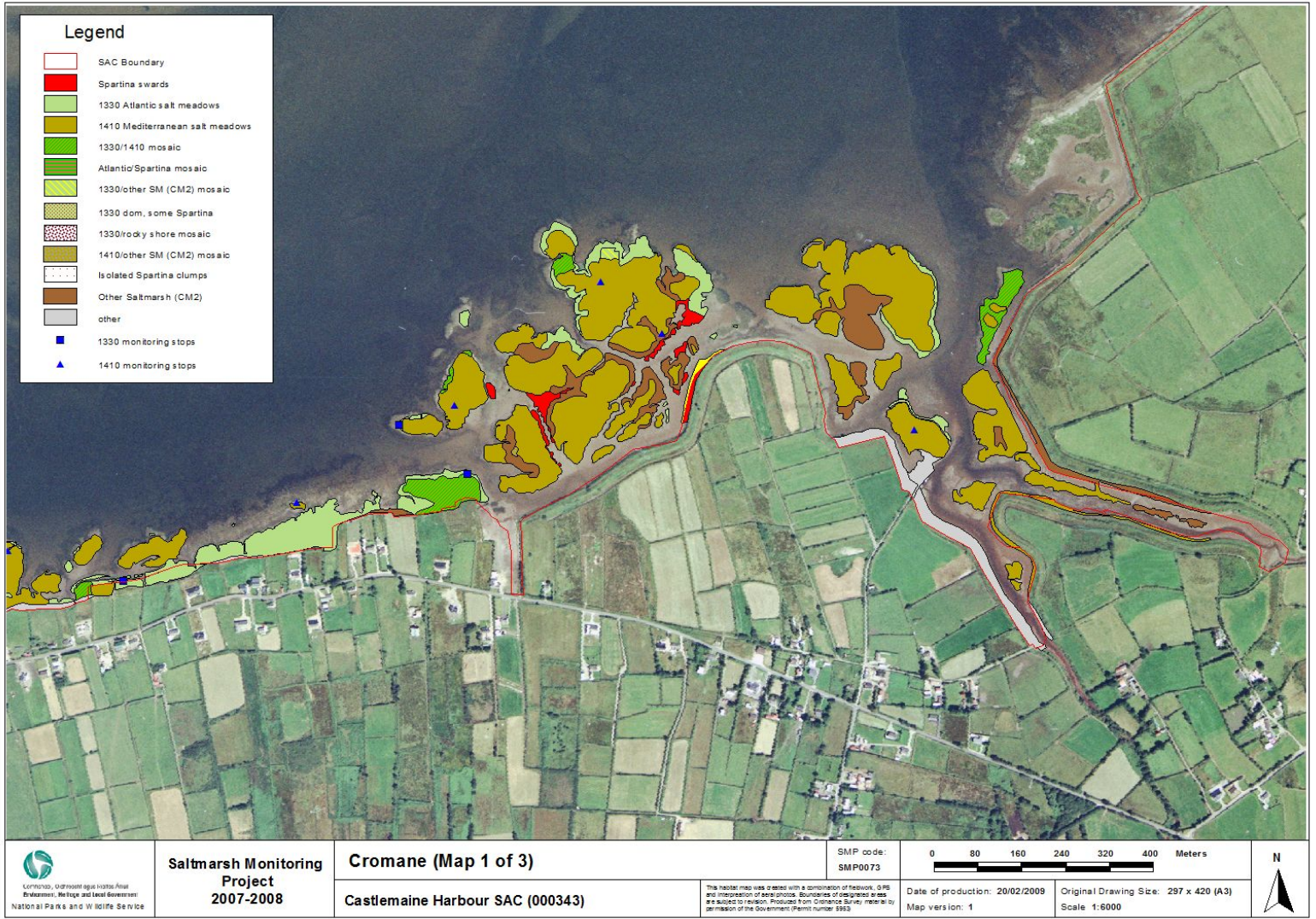
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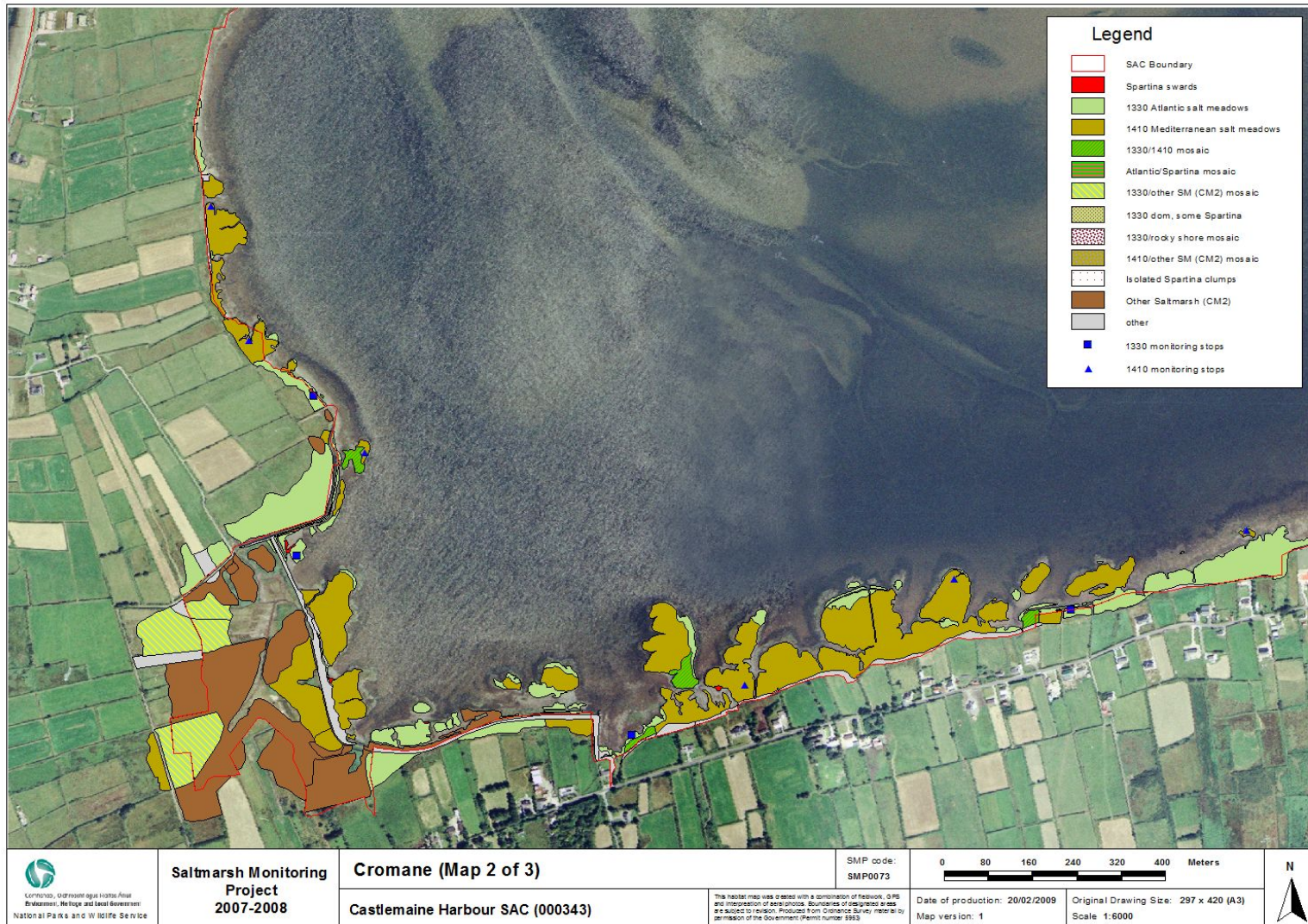
## 8 APPENDIX I

**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						
2	Spartina swards	0.75					0.75
3	1330 Atlantic salt meadow	11.103		11.103			
4	1410 Mediterranean salt meadow	27.92			27.92		
5	ASM/MSM mosaic (50/50)	2.64		1.32	1.32		
6	ASM/ <i>Spartina</i> mosaic	0.513		0.256			0.257
7	1330/other SM (CM2) mosaic	2.391		1.196			
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	4.113					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)						
11	Isolated <i>Spartina</i> clumps on mud (5%)	0.004					0.000
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic	0.15			0.075		
14	<i>Spartina</i> sward dominated, with some ASM						
15	1310/ <i>Spartina</i> mosaic						
16	ASM dominated with some <i>Spartina</i>	0.021		0.021			
17	1330/sand dune mosaic						
18	Other SM (CM2)	9.872					
19	1330/rocky shore mosaic	0.021		0.011			
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	<b>Total</b>	<b>59.498</b>		<b>13.907</b>	<b>29.315</b>		<b>1.007</b>











## Appendix IV – Whitegate-Fybagh site report and habitat map from Saltmarsh Monitoring Project (McCorry & Ryle, 2009).

### 1 SITE DETAILS

SMP site name: <b>Whitegate-Fybagh</b>	SMP site code: <b>SMP0074</b>
Date of site visit <b>08/05/2008</b>	CMP site code: <b>N/A</b>
SM inventory site name: <b>Whitegate-Fybagh</b>	SM inventory site code: <b>164</b>
NPWS Site Name: <b>Castlemaine Harbour</b>	
NPWS designation cSAC: <b>343</b> pNHA: <b>343</b>	MPSU Plan: <b>old format draft 2 plan available</b> SPA: <b>4029</b>
County: <b>Kerry</b>	Discovery Map: <b>71</b> Grid Ref: <b>075550, 101985</b>
Aerial photos (2000 series): <b>O 5869-A,B; O 5870-A, B,C,D</b>	6 inch Map No: <b>Ke 46</b>
Annex I habitats currently listed as qualifying interests for Castlemaine Harbour cSAC:	
<b>H1310 Salicornia and other annuals colonizing mud and sand</b>	
<b>H1330 Atlantic salt meadows (<i>Glauco-Puccinellietalia maritimae</i>)</b>	
<b>H1410 Mediterranean salt meadows (<i>Juncetalia maritimi</i>)</b>	
Other SMP sites within this SAC/NHA: <b>Inch, Rosbehy, Cromane</b>	
Saltmarsh type: <b>Fringe</b>	Substrate type: <b>Peat, Sand, Mud</b>

### 2 SITE DESCRIPTION

Fybagh-Whitegate saltmarsh is located in south-west Co. Kerry in Castlemaine Harbour. This survey site incorporates about 5 km of indented shoreline along the north-east corner of Castlemaine Harbour. The site is located about 7 km from Castlemaine. The River Maine enters Castlemaine Harbour at the eastern end of the survey site and the starting point for the survey was a small quay used as a ferry across the river. The shoreline of this area has been significantly modified by reclamation in the 19<sup>th</sup> Century and high berms line the shoreline. The landscape of this area is dominated by lowland habitats including wet grassland and improved grassland and land adjacent to this part of the estuary is quite flat. Much of the land behind the embankments contains low-lying wet grassland that was formerly saltmarsh and freshwater marshland. There are some signs of brackish influence on vegetation in the drainage channels that drain these areas with some stands of Sea Club-rush (*Bolboschoenus maritimus*) but there was no vegetation that could be classified as saltmarsh.

Fragmented saltmarsh is found along the shoreline along the seaward side of the embankment. Some saltmarsh is found on small isolated 'islands' of habitat separated from the embankment. This part of Castlemaine Harbour is quite shallow and empties at low tide to expose a wide area of intertidal flats between the shoreline and the estuarine river channel of the River Maine.

This site is part of Castlemaine Harbour cSAC (Site Code 000343). This cSAC covers most of the intertidal and sub-tidal parts of Castlemaine Harbour east of Rosbehy and Inch spits. The cSAC also includes the sand dune complexes at Inch and Rosbehy and the shingle spit at Cromane. The cSAC also includes some of the catchments of the Rivers Laune and Maine, which both flow into the head of the bay and forms the estuary of these rivers. Two Annex I saltmarsh habitats are found at this site, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM). Both habitats are listed as qualifying interests for this cSAC, along with *Salicornia* flats, which was not found at this site. *Spartina* swards are also found on the intertidal flats at this site, although this habitat is not now considered to qualify as an Annex I habitat.

Three other saltmarshes sites listed on the SM inventory (Curtis and Sheehy-Skeffington 1998) and located within this cSAC were surveyed during this project, Inch, Cromane and Whitegate-Fybagh. There is additional saltmarsh development in many of the small indentations along the shoreline, including significant areas of unsurveyed saltmarsh located between Cromane and the mouth of the River Laune.

Turf fucoids are the only species of local distinctiveness recorded at this site and these are typical of saltmarsh found along the western coast of Ireland.

Nearly all the saltmarsh habitat is found within the digital cSAC boundary. The berm is used as the cSAC boundary and a significant part of the reclaimed wet grassland behind the berm has also been included in the cSAC.

The shoreline was accessed at various points from minor roads or private lanes that access adjacent farmland.

### **3 SALTMARSH HABITATS**

#### **3.1 General description**

The saltmarsh at this site is quite fragmented and spread along the shoreline in small patches. The embankments are generally quite straight and undulate around the site, following the gross shape of the shoreline. This has created some more sheltered sections in some of the indentations along the shoreline. There are sections where there is no saltmarsh along the steep sided embankments.

There are similar amounts of Mediterranean salt meadows and Atlantic salt meadows along the shoreline, generally forming a heterogeneous mosaic along with stands of Common Reed (*Phragmites australis*) and Sea Club-rush (Table 3.1). There is no typical zonation between these habitats. The marshland habitat along this shoreline is actually dominated by brackish vegetation types and non-Annex I saltmarsh vegetation types such as stands of Common Reed and 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. Both



these species also form mosaics with other saltmarsh vegetation. These mosaics along with Common Reed dominate the vegetation of some large relic patches of marshland on mud and peat along the shore near Caherfealane Marsh and Gortaleen towards the west of the site. This reflects the estuarine influence on the saltmarsh along this shoreline.

It is unusual to observe stands dominated by Common Reed at the seaward boundary of some of these marshland areas in a bay of this type, although this type of zonation was also seen in larger estuaries such as the Shannon. The stands of Common Reed also contain Red Fescue (*Festuca rubra*), Twitch (*Elymus repens*), Silverweed (*Potentilla erecta*), Curled Dock (*Rumex crispus*), Creeping Bentgrass (*Agrostis stolonifera*) and Sea Club-rush. The ASM or MSM may be found in sheltered sections landward of small stands of Common Reed or Sea Club-rush, but on lower ground that probably is inundated more frequently. Curtis and Sheehy-Skeffington (1998) classified this site as a fringe type marsh but it is probably more typical of an estuarine type site. Some of the saltmarsh has developed on peat but there is also a significant amount of saltmarsh on peat and sandy substrates.

Both MSM and ASM are found in small eroded relic saltmarsh patches along the seaward side of the berm. There is also a narrow strip of saltmarsh vegetation where the embankment is inundated by tides. There is also some saltmarsh development in the mouths of several streams that flow into the bay along this shoreline. Some of the saltmarsh is quite patchy and found on thin layers of eroding muddy substrate that overlay rocky pebble and stony material, possibly laid down to form the embankment. Further west there are some patches where the saltmarsh overlays glacial deposits that form the beach material.

The lower saltmarsh boundary is generally marked by a saltmarsh cliff adjacent to soft intertidal flats. There are also some transitions to sandflats in places and further west there is some transition to pebble and mixed mud substrate along the lower boundary. Further west there is a small area of relic MSM saltmarsh that has developed behind a small shingle spit at Roscullen Island. This small area contains typical saltmarsh zonation and ASM communities. The saltmarsh vegetation generally transitions to wet grassland along the upper boundary on the embankment.

There is some diverse saltmarsh at the west side of the site at Gortaleen. This saltmarsh has developed on a fairly high platform along the shoreline and there is a steep saltmarsh cliff down to the intertidal flats. There are natural vegetation succession from small patches of MSM to brackish communities dominated by Sea Club-rush and also other non-Annex I saltmarsh vegetation dominated by Twitch. This community also contains Silverweed, Bindweed, Sea Rush (*Juncus maritimus*), Sea Milkwort (*Glaux maritima*) and Curled Dock. This community appears along the upper boundary of some of the saltmarsh.

One notable feature of this site is the appearance of fairly large patches of Sea Rush colonising the intertidal flats at the seaward side of the more established saltmarsh and forming pioneer communities. These are usually mono-specific swards or mosaic of clumps and bare mudflats and do not contain other saltmarsh species. These patches may not be

colonising mud adjacent to other saltmarsh but are sometimes isolated from the other relic saltmarsh or the embankment. Vegetation dominated by Sea Rush is most commonly seen in the upper saltmarsh but is frequently distributed along the lower saltmarsh boundary in saltmarshes along the west coast of Ireland. The spread of Sea Rush on intertidal mud is an unusual feature but it was also observed at some other sites in Castlemaine Harbour including Inch and was observed in the River Blackwater Estuary (Cork/Waterford) and to a lesser extent in many small sites in Galway and Mayo. This feature may also be related to the estuarine influence on the site. The appearance of these stands may also be an indicator of saltmarsh growth and expansion even though there are many signs of erosion around the site.

Common Cordgrass (*Spartina anglica*) is distributed along most of the survey site but is most frequent towards the eastern side of the site. This species has formed some patches of *Spartina* swards in an area of intertidal mudflats partially sheltered by an old eroded berm at Caherfealane Marsh. Large clumps are scattered on the intertidal flats along the shoreline and there are few large areas of *Spartina* sward along the rest of the site.

**Table 3.1.** Area of saltmarsh habitats mapped at Whitegate.

EU Code	Habitat	Area (ha)
1330	Atlantic salt meadows ( <i>Glauco-Puccinellietalia maritimae</i> )	2.553
1410	Mediterranean salt meadows ( <i>Juncetalia maritimi</i> )	2.605
non-Annex	<i>Spartina</i> swards	0.147
	<b>Total</b>	<b>5.305</b>

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

### 3.2 Atlantic salt meadows (H1330)

Several typical ASM communities are found at this site. Mid marsh and mid-upper marsh communities dominate the ASM vegetation. There is very little lower marsh ASM vegetation at this site. There are few sections with typical zonation because most sections are quite small, but overall diversity is quite high due to the varied topography and varied substrates along the shoreline. The most typical community found along the embankment is dominated by one of Red Fescue, Saltmarsh Rush (*Juncus gerardii*) and Creeping Bent. There may also be frequent or abundant cover of Buck's-horn Plantain in this community. Other species present include Sea Milkwort, Sea Plantain (*Plantago maritima*), Sea Arrowgrass (*Triglochin maritimum*), White Clover (*Trifolium repens*), Common Scurvygrass (*Cochlearia officinalis*) and Sea Pink (*Armeria maritima*). The ASM also contains scattered clumps of Sea Rush in places but at low densities. Some sections of the saltmarsh are mapped as a mosaic between ASM and MSM. Sea Club-rush also spreads into the ASM at some locations.

Some of the narrow saltmarsh fringe on the embankment is dominated by Saltmarsh Rush. This habitat is only several metres wide. This community also contains Sea Plantain, Buck's-

horn Plantain (*Plantago coronopus*), Sea Arrowgrass and Sea Milkwort. Even in this relatively narrow band of saltmarsh there are some signs of zonation with a band of vegetation dominated by Creeping Bentgrass appearing on the landward side of this zone, higher up the embankment.

There is some minor development of low-mid ASM community along the seaward edge of some of the eroding fragments of ASM and on some of the lower patches of relic saltmarsh. This community is dominated by Sea Pink, Sea Plantain and Common Saltmarsh-grass (*Puccinellia maritima*) and also contains species such as Sea Milkwort and Sea Aster (*Aster tripolium*). Common Cordgrass is also found in the ASM but generally at low densities (1-5%).

Further west there is an upper marsh community that has developed adjacent to a stand of Common Reed. This stand is dominated by Creeping Bent and contains some Sea Club-rush. Other species found in small amounts include Sea Milkwort and Spear-leaved Orache (*Atriplex prostrata*). This area may be influenced by freshwater flow off the adjacent reclaimed land.

The saltmarsh topography overall is generally quite poor and there are few relic patches with typical features such as salt pans and creeks. Few of the relic patches of saltmarsh are large enough to require creeks. Some of the ASM that has developed on the relic patches and the old berm at Caherfealane Marsh contains typical small salt pans.

### **3.3 Mediterranean salt meadows (H1410)**

This habitat is generally characterised by the frequent presence of clumps of Sea Rush on established saltmarsh. The vegetation is quite diverse due to the varied topography along a relatively long stretch of shoreline. This species is usually found in association with other mid-upper species such as Red Fescue, Saltmarsh Rush and Creeping Bentgrass. Common Reed spreads into MSM along the upper habitat boundary in places, as does Sea Club-rush where there are adjacent stands of these species.

The largest intact area of MSM is found at Roscullen Island. This section has some typical zonation and contains small salt pans. Saltmarsh has developed along the back of a small shingle spit and there is some zonation related to the height of the marsh along a gradient from the spit to the seaward end of the saltmarsh. The lower MSM is dominated by Sea Rush and also contains Saltmarsh Rush, Common Scurvygrass and Sea Milkwort. The upper MSM contains more frequent grass cover with Red Fescue more prominent and Creeping Bent also appearing. This community also contains Autumn Hawkbit (*Leontodon autumnalis*) and Brookweed (*Samolus valerandi*). Species such as Birdsfoot (*Lotus corniculatus*) and Silverweed also appear in the MSM vegetation near the upper boundary.

One notable feature of this site is the appearance of stands of Sea Rush colonising bare intertidal mud, sometimes some distance seaward of established saltmarsh on higher mud or the embankment. Sea Rush is creating a pioneer community in this situation. These stands

are generally mono-specific and are quite open with frequent bare mud cover. Some of these stands consist of small clumps of Sea Rush in a mosaic with bare mud cover. These small clumps of Sea Rush may also be found in association with occasional clumps of Common Cordgrass, with Sea Rush being much more numerous.

Some diverse MSM with several zones present is found at Gortaleen. Typical Sea Rush dominated stands are found more on established saltmarsh that also contain Wild Celery (*Apium graveolens*) near the upper boundary and also Parsley Water-dropwort (*Oenanthe lachenalii*). There are vegetation successions at the upper boundary to vegetation dominated by Twitch and to stands dominated by Common Reed. Sea Rush is also colonising mudflats forming a dense zone of MSM adjacent to the more established saltmarsh. This community has species such as Common Saltmarsh-grass and Sea Milkwort spreading into the upper zone and this may be taken as evidence of saltmarsh growth and continuing succession, even though there are many signs of erosion around the site.

There is some development of a transitional MSM community along the drift line or upper boundary in places where clumps of Sea Rush are found in association with other terrestrial species such as Jointed Rush (*Juncus articulatus*), Purple Moor-grass (*Molinia caerulea*) and Curled Dock.

### **3.4 *Spartina* swards**

There are small fragmented patches of *Spartina* swards developed at this site. These generally occur where several large clumps of Common Cordgrass have coalesced. There are also small patches with a mosaic of spare clumps of Common Cordgrass and mudflats. Most of the isolated clumps are quite large and there are few signs of any recent recruitment of new clumps to the population. The overall cover of *Spartina* sward is quite low at this site.

The main patches of *Spartina* sward are found in a small intertidal area sheltered by an old eroding berm at Caherfealane Marsh. This is one of the locations where the position berm has retreated in the past 100 years, probably in response to a breach. The sheltered position probably increased the prospects of the colonisation of Common Cordgrass, especially along a shoreline that is under some erosional pressure.

Many patches of *Spartina* sward are generally quite isolated and there is no typical natural transition from MSM or ASM habitat into *Spartina* sward. There are some patches that have colonised bare mud adjacent to some of the relic patches of saltmarsh habitat. Common Cordgrass has not colonised existing saltmarsh to create *Spartina* sward.

There are also several sections where there has been some development of mixed swards of Common Cordgrass and Sea Rush. These have already been described. Similar vegetation where Common Cordgrass and Sea Club-rush are found mixed together is also present. Both these communities are unusual vegetation types.

#### 4 IMPACTS AND ACTIVITIES

This site is affected by several impacts and activities (Table 4.1). The main impact is grazing (140). Cattle and sheep roam along the high embankment/berm and graze the embankment and adjacent saltmarsh. The survey site is divided up into different management units as it extends along land with different owners and sections are grazed with different intensities, with some sections not grazed at all. Horses graze one section. The overall grazing intensity is light/moderate. There is some localised damage from poaching and overgrazing, mainly at some access points onto saltmarsh and in patches where drainage is impeded (143). Grazing animals have also created tracks on saltmarsh in places.

There have been some recent repairs to the embankment in places by the OPW (801). The embankment was partially breached for a short period during the current monitoring period and this may have allowed brackish vegetation to develop behind the embankment at one location. This breach has now been repaired. These repairs have caused some damage to the saltmarsh in places where vehicles crossed the saltmarsh, removed substrate from the saltmarsh or re-profiled the seaward side of the embankment, removing saltmarsh vegetation. These damaged areas are likely to be revegetated with saltmarsh in the long-term.

Common Cordgrass is present at this site. This is an invasive species of saltmarsh (954) and is widely distributed in Castlemaine Harbour. This is its most southerly limit along the western Irish shoreline and it is only found again in Clonikilty Bay, Co. Cork. It is not known when it was planted in Castlemaine Harbour although it is known from this area since the 1960's (Nairn 1986). Common Cordgrass is only very rarely found within the established ASM or MSM vegetation and the overall cover is less than 1%. Therefore the impact of its presence is assessed as neutral. However, large clumps are widely distributed along the site on the adjacent intertidal mudflats, forming some patches of *Spartina* swards habitat in places. Common Cordgrass has also colonised mudflats with Sea Rush and with Sea Club-rush in places, creating unusual vegetation communities. There are no indications of any recent recruitment and small clumps are rare. There are no indications that it has spread significantly during the current monitoring period from the survey or from an examination of the aerial photos.

There are frequent indicators of erosion on the saltmarsh along this site (900). There are eroded mud platforms with saltmarsh cliffs present along the seaward side of the saltmarsh fragments and cliff toppling was also noted in places. The lower saltmarsh has a quite convoluted boundary in places from the impacts of erosion. The sward surface of the ASM also shows signs of erosion in places, particularly towards the west side of the site. This saltmarsh is more vulnerable to erosion as it has developed on thinner substrate and there are isolated patches of saltmarsh and bare mud located further down a mixed rocky beach shoreline. A comparison of the OSI 2<sup>nd</sup> edition 6 inch map to the OSI 2005 series aerial photos shows that many of the relic saltmarsh patches have got smaller during this period and some patches have disappeared altogether. However some of these patches are likely

to have been removed to provide material to repair the berms in places. Erosion is assessed as having a low negative impact.

The appearance of Sea Rush colonising intertidal flats at the seaward side of the more established saltmarsh could be taken as an indicator of some local saltmarsh growth and expansion. However, erosion seems to be the greater trend acting on the site.

The saltmarsh at this site has been significantly modified by the construction of a berm and reclamation of land along the shoreline of this part of Castlemaine Harbour (801). The berms begin at the west side of the survey site and extend eastwards along the banks of the River Maine. The majority of this reclamation and the construction of the berms occurred during the 19<sup>th</sup> century and a comparison of the 1<sup>st</sup> edition and 2<sup>nd</sup> edition shows significant changes to the shoreline during this period. However the reclamation was carried out in stages. Some of the berm construction and reclamation predates the drawing of the 1<sup>st</sup> edition six inch map and subsequent construction of the embankment enclosed increasing amounts of saltmarsh. The former marshland behind the berms has also been drained intensively and divided into new field enclosures. Old intertidal channels between former saltmarsh are still visible on the topography of these reclaimed areas and many of these are filled with Reedbeds.

A significant amount of former saltmarsh, brackish marsh and Reedbeds has been trapped behind the berm with small fragments of relic saltmarsh left on the seaward side of the berm that form the current saltmarsh habitat. Parts of the shoreline have also been modified in the past 100 years and the position of the berm has retreated in one section. These impacts are not assessed as they occurred outside the current monitoring period but have had a very significant impact on the structure of this site.

The main impacts and activities around the site are related to farming of the land behind the embankment. Much of this land has not been improved significantly and the enclosures are still dominated by Reedbeds and wet grassland. It is likely that the status of this land has deteriorated in recent times and was probably more intensively managed in the past. Some of the former saltmarsh has been improved significantly and some of the new enclosures now contain improved grassland. Farming activities such as mowing/cutting (102), fertilization (120) and grazing (140) all occur in some of the adjacent low-lying land behind the embankments. The intensity of the farming varies in this area. The shoreline can also be accessed by several tracks and roads (501) and there is some scattered habitation (403) in the area, but on higher ground some distance from the shoreline. These activities have little or no measurable impact on the saltmarsh habitats.

**Table 4.1.** Intensity of various activities on saltmarsh habitats at Whitegate.

EU Habitat Code	Activity code	Intensity	Impact	Area affected (ha)	Location of activity
1330	140	C	0	1.5	Inside
1330	143	C	-1	0.25	Inside
1330	801	A	-1	0.1	Inside
1330	900	B	-2	0.25	Inside
1330	954	C	0	0.05	Inside
1410	140	C	0	2.0	Inside
1410	143	C	-1	0.25	Inside
1410	801	A	-1	0.1	Inside
1410	900	B	-2	0.26	Inside
1410	954	C	0	0.2	Inside

<sup>1</sup> EU codes as per Interpretation Manual.

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

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

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

<sup>5</sup> 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. There was no specific information available for this site.

Whitegate-Fybagh is a relatively small saltmarsh with few features of notable interest. The original saltmarsh was significantly modified by reclamation in the 19<sup>th</sup> century and the remaining saltmarsh is quite fragmentary. The remaining saltmarsh shows frequent indicators of erosion. The overall conservation status of this site is *unfavourable-bad*. There have been measurable losses of saltmarsh in the past 100 years (although no measurable loss during the current monitoring period) and this saltmarsh is vulnerable to continued erosion in the future. One feature of interest is the unusual pioneer saltmarsh community consisting of Sea Rush colonising intertidal mud.

It can be assumed that this erosion is a 'natural' process and is part of the natural geomorphological patterns in Castlemaine Harbour. The erosion may also be a response to the land reclamation along this part of the shoreline. Another factor to take into account is that

this site is only one of four located in Castlemaine Harbour. Erosion is not as significant at Inch where pioneer saltmarsh vegetation is much more evident whereas signs of erosion were also seen at Cromane. Erosion of saltmarsh at Rosbehy is neutral with some erosion and accretion at this site. It seems that overall there is a trend of erosion acting on saltmarsh in the inner part of Castlemaine Harbour. This erosional pressure is also indicated by the status of the embankments that protect low-lying land around much of Castlemaine Harbour including at Cromane. Many of these berms show signs of erosion and some have been recently breached while other are being repaired.

This site is located within Castlemaine Harbour cSAC. An old format NPWS management plan is available for this cSAC but is now out of date.

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

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 - Bad
Mediterranean salt meadows (1410)	Extent		Structure and functions, Future prospects	Unfavourable - Bad

## 5.2 Atlantic salt meadows (H1330)

### 5.2.1 Extent

The extent of this habitat is assessed as *favourable*. There are no indications of any significant loss of habitat due to land use changes, development or erosion within the current monitoring period. A small amount of habitat has been disturbed by repairs to one part of the embankment and associated reproofing. However, this area is likely to re-vegetate. There are frequent indicators of erosion of saltmarsh at this site and there are measurable losses of saltmarsh when considering a longer period between the drawing of the 2<sup>nd</sup> edition OSI 6 inch map and the OSI aerial photos 2005 series.

### 5.2.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-bad*. Six stops monitoring stops were carried out in this habitat and one stop failed due to poaching damage. Most of the current saltmarsh is in fairly good condition. There is some localised poaching and overgrazing damage in places but the overall grazing level is considered to be light-moderate. The sward height is quite variable across the site and some sections are not grazed at all. There are also frequent signs of erosion acting on the saltmarsh at this site.



This is the main reason for the re-assessment of the conservation status as *unfavourable-bad* rather than *unfavourable-inadequate*.

The ASM saltmarsh has been significantly modified in the past by reclamation and the construction of the tall embankment. This has had a huge impact on the structure and function of the habitat at this site, although these impacts are not assessed. The remaining patches of saltmarsh are fragmentary and have a poor saltmarsh topography. The diversity of vegetation is relatively high but there are few patches with extensive intact zonation. There are some notable transitions with brackish saltmarsh communities. Common Cordgrass is present at this site but does not form a significant part of the ASM vegetation. The impact of its spread on species composition is assessed as neutral.

### **5.2.3 Future prospects**

The future prospects of this habitat are assessed as *unfavourable-bad*. This assessment assumes that the current management activities and level of impacts such as grazing continue in the near future. Grazing is not having a significant impact on the remaining ASM at this site. However, there are frequent signs of erosion at this site and the remaining saltmarsh is vulnerable to continued erosion. Much of the ASM saltmarsh at this site is not vulnerable to further colonisation by Common Cordgrass in the future as most of the ASM saltmarsh habitat is in the mid-upper zone.

## **5.3 Mediterranean salt meadows (H1410)**

### **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 land use changes, development or erosion within the current monitoring period. A small amount of habitat has been disturbed by repairs to one part of the embankment and associated reproofing. However, this area is likely to re-vegetate. There are frequent indicators of erosion of saltmarsh at this site and there are measurable losses of saltmarsh when considering a longer period between the drawing of the 2<sup>nd</sup> edition OSI 6 inch map and the OSI aerial photos 2005 series.

### **5.3.2 Habitat structure and functions**

The structure and functions of this habitat are assessed as *unfavourable-bad*. Eight stops monitoring stops were carried out in this habitat and two stops failed due to a combination of poaching damage and indicators of erosion. Most of the current saltmarsh is in fairly good condition. There is some localised poaching and overgrazing damage in places but the overall grazing level is considered to be light-moderate. The MSM has a typical species assemblage and is somewhat more diverse compared to other site. The diversity reflects notable transitions to other brackish vegetation communities at the upper habitat boundary. It also reflects the presence of a pioneer saltmarsh community dominated by Sea Rush where

clumps are colonising saltmarsh. Common Cordgrass is also present in this pioneer community.

There are also frequent signs of erosion acting on the saltmarsh at this site. Erosion acts on both the ASM and MSM because these habitats are distributed in a heterogeneous mosaic. This is the main reason for the re-assessment of the conservation status as *unfavourable-bad* rather than *unfavourable-inadequate*.

The MSM saltmarsh has been significantly modified in the past by reclamation and the construction of the tall embankment. This has had a huge impact on the structure and function of the habitat at this site, although these impacts are not assessed. The remaining patches of saltmarsh are fragmentary and have a poor saltmarsh topography.

### **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 such as grazing continue in the near future. Grazing is not having a significant impact on the remaining MSM at this site. However, there are frequent signs of erosion at this site and the remaining saltmarsh is vulnerable to continued erosion.

The assessment of the future prospects as *unfavourable-bad* takes account of the frequent indicators of erosion around the site. The remaining saltmarsh is vulnerable to further erosion but the development of pioneer Sea Rush stands on the mudflats could be taken as evidence of possible MSM expansion in the future. These pioneer stands of MSM may be vulnerable to future colonisation by Common Cordgrass. While this species has not spread at this site in the recent past it is expanding at a nearby saltmarsh at Inch. MSM found on more established saltmarsh is not vulnerable to colonisation by this species.

## **6 MANAGEMENT RECOMMENDATIONS**

There are no management recommendations for this site.

## **7 REFERENCES**

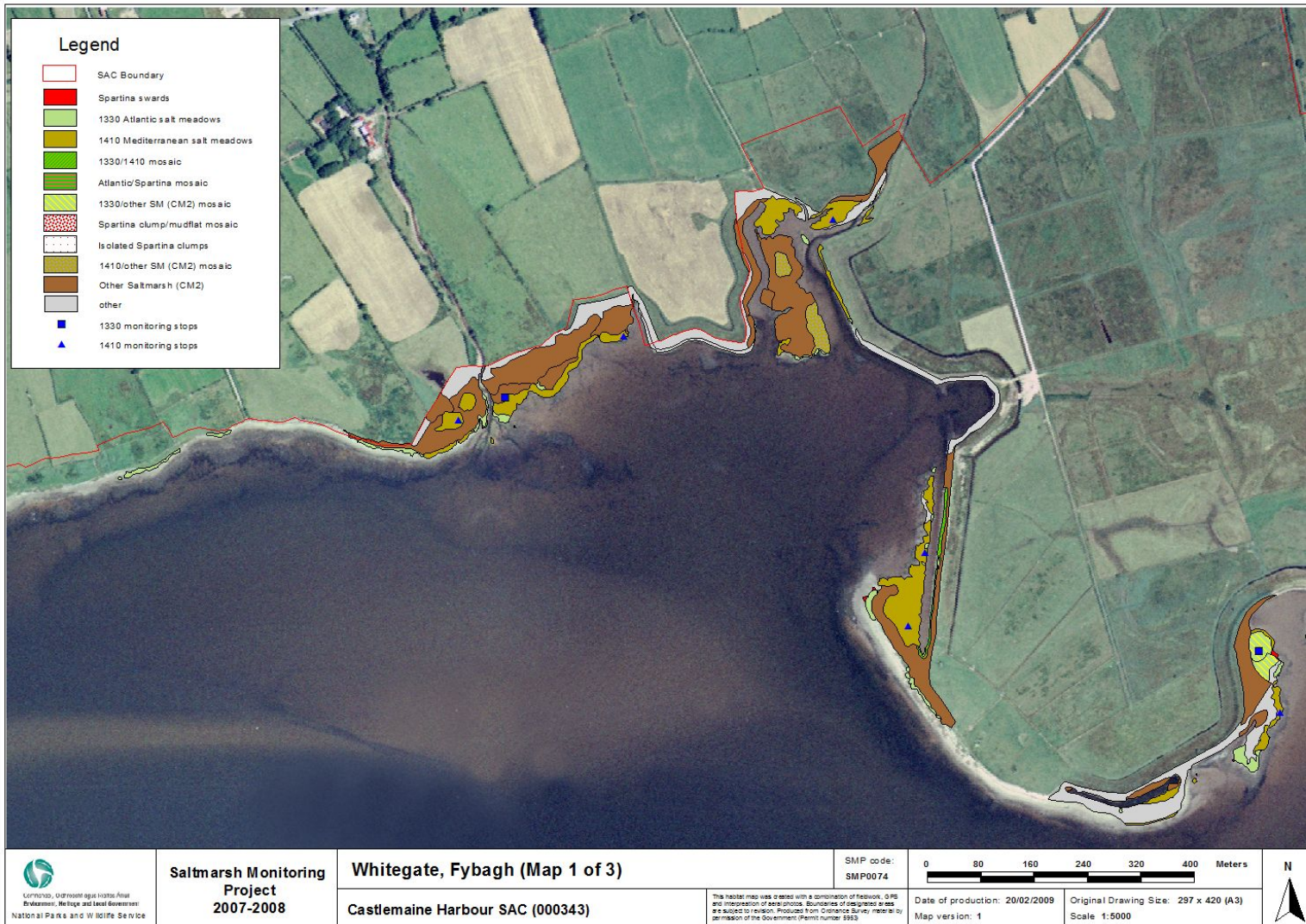
Curtis, T.G.F.C. and Sheehy-Skeffington, M.J. (1998). The saltmarshes of Ireland: An inventory and account of their geographical variation. *Biology and Environment: Proceedings of the Royal Irish Academy* **98B**, 87-104.

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

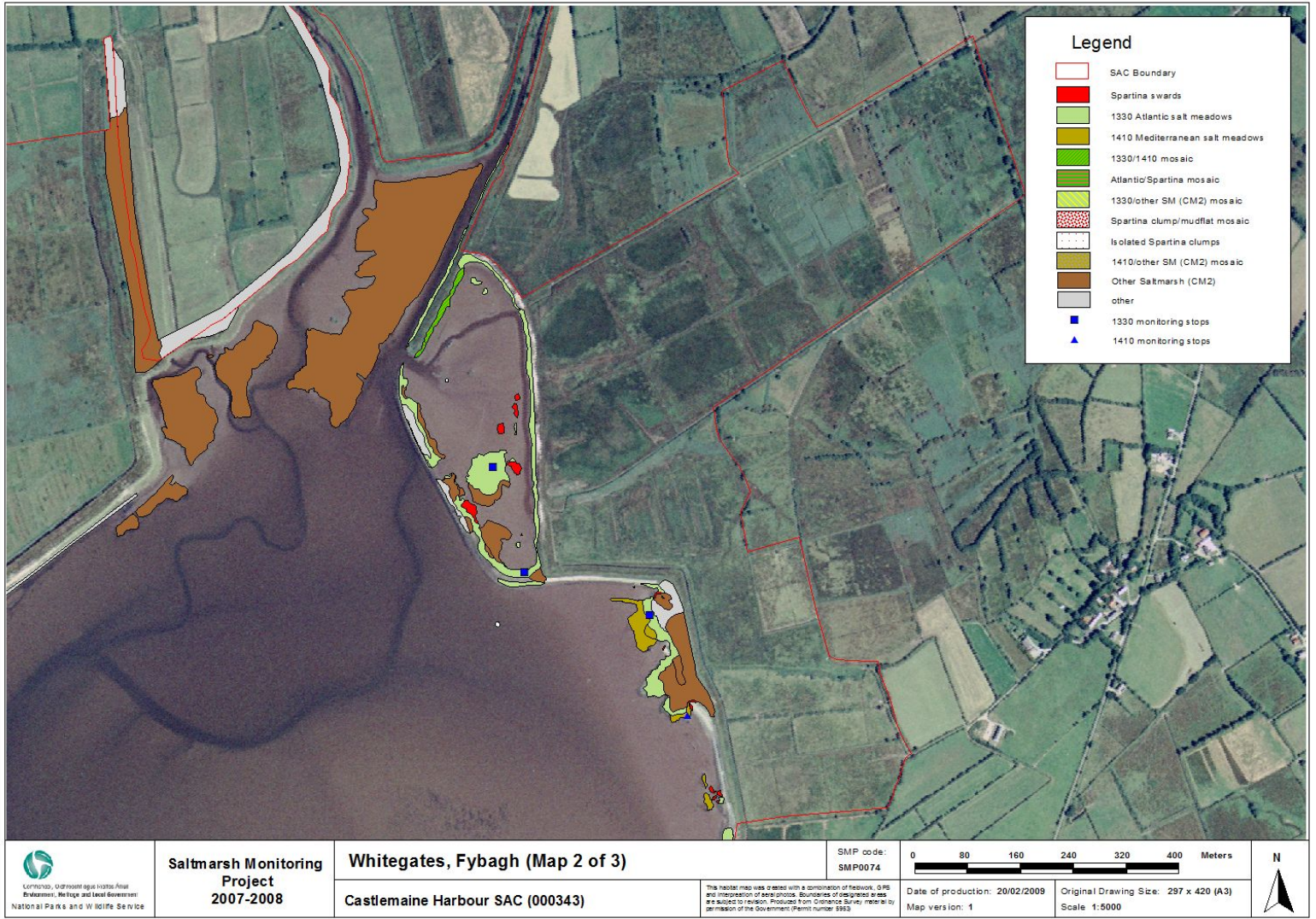
## 8 APPENDIX I

**Table 8.1.** Areas of SMP habitats mapped using GIS.

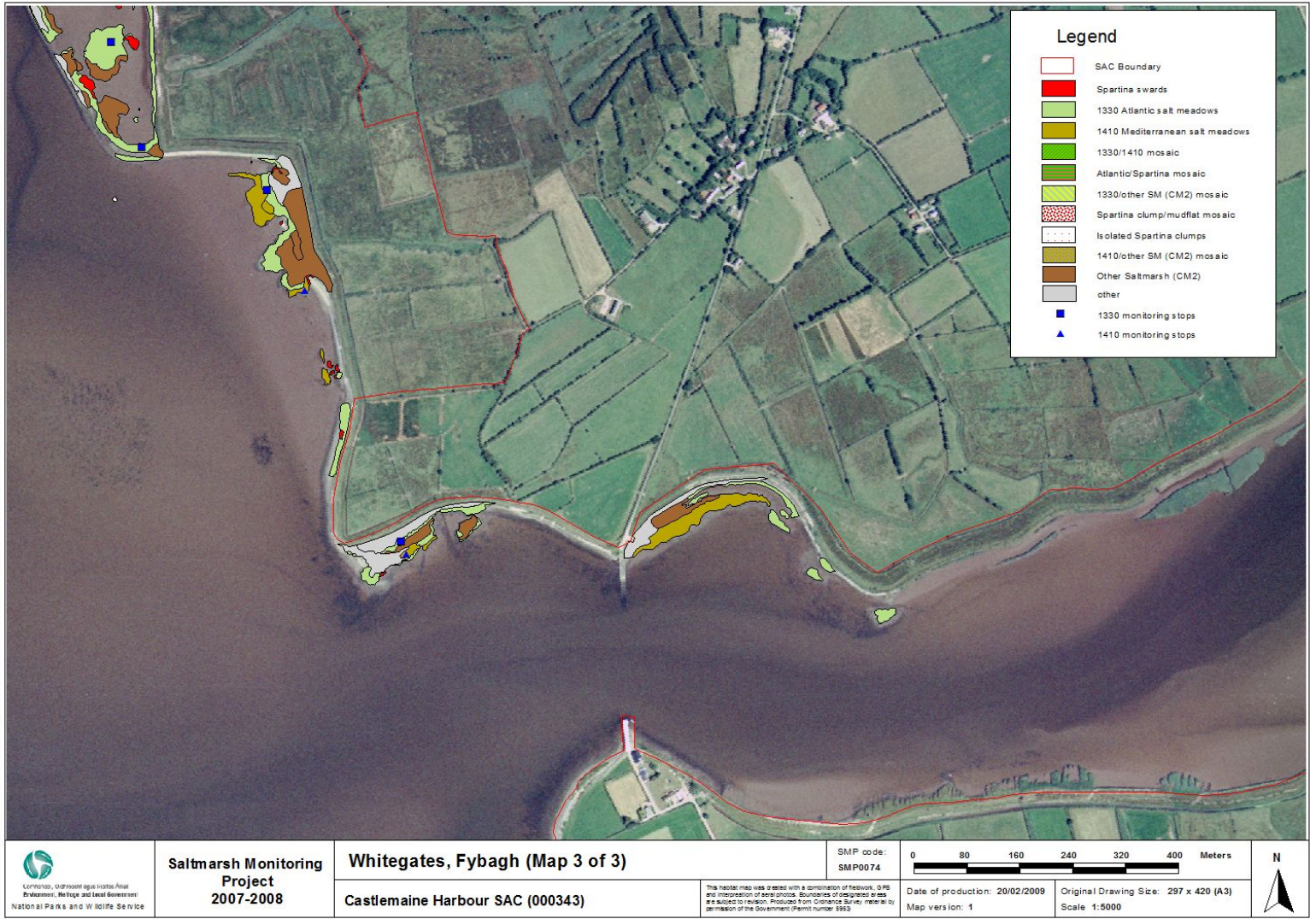
SM Habitat code	SM habitat description	Mapped Area (ha)	Area (ha)				
			1310	1330	1410	1420	Spartina swards
1	1310 <i>Salicornia</i> flats						
2	Spartina swards	0.145					0.145
3	1330 Atlantic salt meadow	2.419		2.419			
4	1410 Mediterranean salt meadow	2.394			2.394		
5	ASM/MSM mosaic (50/50)	0.184		0.092	0.092		
6	ASM/ <i>Spartina</i> mosaic	0.003		0.001			0.002
7	1330/other SM (CM2) mosaic	0.081		0.041			
8	1330/coastal grsld mosaic						
9	Other (non saltmarsh)	4.975					
10	<i>Spartina</i> clump/mudflat mosaic (50/50)	0.000					0.000
11	Isolated <i>Spartina</i> clumps on mud (5%)	0.006					0.000
12	pioneer 1330/1310/ <i>Spartina</i> mosaic						
13	1410/other SM (CM2) mosaic	0.237			0.118		
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)	12.463					
19	1330/rocky shore mosaic						
20	1420 Mediterranean scrub						
21	1310/1330 mosaic						
	<b>Total</b>	<b>22.907</b>		<b>2.553</b>	<b>2.605</b>		<b>0.147</b>











## Appendix V – Inch site report and habitat map from Coastal Monitoring Project (Ryle *et al.*, 2009).

### SITE DETAILS

CMP04 site name: **Inch**    CMP04 site code: **070**    CMP Map No.: **67**

County: **Kerry**    Discovery map: **78**    Grid Reference: **V 070 095**

6 inch Map No.: **Ke 045 & 055**

Aerial photographs (2000 series): **O 5866-D; O 5867-C&D; O 5930-A, B, C, D; O5984-A, B**

NPWS Site Name: **Castlemaine Harbour**

NPWS designation:    pNHA: **343**    cSAC: **343**    SPA: **4029**

Other designation:    Nature Reserve: **SI 10: 1990**

Other Designation: **Blue Flag 2005. Conservation Area - Kerry County Council**

Ranger Area: **Southwest**

MPSU Plan: **Draft 2, Public Consultation 29/03/00**

Report Author: **Tim Ryle**

### SITE DESCRIPTION

Inch spit is included in Castlemaine Harbour candidate Special Area of Conservation (cSAC 343) along with a second sand dune system at Rosbehy (CMP site 68). This is an extensive and highly complex cSAC, consisting of a large estuarine system. The site covers thirteen habitats listed on Annex I of the EU Habitats Directive (92/43/EEC). Eleven of these habitats are found on Inch (all except estuaries and alluvial forests). Approximately 90-95% of the site is covered in Annex I habitat. A substantial proportion of the sand dune system is comprised of fixed dune (estimated at 76.25%), a priority habitat under the Habitats Directive.

Inch represents one of the few actively accreting sites on the West Coast. Estuarine muds accumulate along the eastern side (associated with saltmarsh) and fine sands on western side (associated with sand dune). The site displays a complex geomorphology and is constantly changing and evolving. Most of the high dunes at Inch are residual dunes, i.e. the original structures have been reworked into ridges running parallel to the direction of the prevailing wind. A number of kitchen middens, which give the site an added archaeological interest, are also found close to the slacks towards the southern tip of the spit. Bare sand in the form of blowouts is a feature of the site. These blowouts represent an integral and natural component of an evolving and highly dynamic dune system. The complex hydrology of the site is inextricably linked to the functioning and dynamism of the system.

The site was not physically surveyed during 2005 but the areas of the various habitats were estimated from the 2000 O.S. aerial photograph. The total sand dune area was estimated at 461.978ha (Table 70A). Although the dune system grades into saltmarsh and occasionally *Spartina* swards, the area of saltmarsh (34.181ha) that is shown on the accompanying habitat map is a considerable under-representation of its true extent. An ecological assessment of the site was carried out in 2003 by NPWS staff (K. Gaynor, 2003). The following EU Annex I sand dune habitats were identified and described at Inch Fixed dunes, Dune slack, Dunes with *Salix repens* ssp. *argentea*, Mobile dunes and Annual vegetation of driftlines.

There are a number of inherent difficulties with delineating habitats solely from aerial photographs. The aeriels that were used in this project are from the year 2000 series, which means that they are up to five years old. In a highly dynamic site such as Inch, it is probable that habitats are in places not accurately mapped. For example, although Gaynor (2003) indicates that the embryonic dunes are 60 metres at their widest point, it is not possible to distinguish them from the aerial photograph, a problem which also applies to annual strandline vegetation. Other errors which should be highlighted include the boundary between sand dune and saltmarsh systems, particularly in light of the drainage channels that are visible (but undated) on the aerial photographs.

**Table 70A** Estimated total area of EU Annex I sand dune habitats at Inch

<b>EU Code</b>	<b>EU Habitat</b>	<b>Area (ha)</b>
H1210	<i>Annual vegetation of driftlines</i>	1.168
H2110	<i>Embryonic shifting dunes</i>	14.405
H2120	<i>Shifting dunes along the shoreline with Ammophila arenaria</i>	25.798
H2130	<i>Fixed coastal dunes with herbaceous vegetation</i>	352.236
H2170	<i>Dunes with S. repens ssp. argentea (Salicion arenaria)</i>	0.343
H2190	<i>Humid dune slacks</i>	32.365
	<b>Total Sand dune</b>	<b>461.978</b>
	<i>Other undefined habitats (on sandy substrates)</i>	1.482
	<b>Potential Sand dune Habitat</b>	<b>463.46</b>

### **Fixed Dunes (H2130)**

The fixed dune – a priority habitat type, as listed under the EU Habitats Directive, covers approximately 65-70% of the total area of Inch (Gaynor, 2003). The site supports a rich and diverse flora that is fully representative of Irish west coast dune systems. The typical species that occur in the fixed dunes include *Galium verum* (Lady's bedstraw), *Lotus corniculatus* (Common bird's-foot-trefoil), *Thymus polytrichus* (Wild thyme), *Anthyllis vulneraria* (Kidney vetch), *Viola tricolor* ssp. *curtisii* (Wild pansy), *Sedum acre* (Biting stonecrop) and *Centaureum erythraea* (Common centaury). There is also a rich lichen and bryophyte flora, particularly on the east and south-facing slopes of the high ridges. Species recorded include the typical fixed



dune species *Rhytidiadelphus triquetrus*, *R squarrosus*, *Tortula ruralis* spp. *ruraliformis*, *Peltigera rufescens*, *P. lactucifolia* and *Cladonia rangiformis*.

### **Dunes with *Salix repens* (H2170)**

Although the paper-map shows only one patch of willow dunes habitat, according to a recent report (Gaynor, 2003), this habitat is well developed at Inch and is generally found on the sides of those dune ridges situated adjacent to damp depressions, or dune slacks. It occurs in association with species typical of drier dune slacks and also those species that are characteristic of fixed dune communities.

### **Dune slacks (2190)**

The site possesses some very large slack areas, which are clearly visible from the aerial photograph. The slacks run generally perpendicular to the beach and in some cases almost traverse the entire spit. These damp depressions display a typical slack flora. The typical slack species depends on the slack type (e.g. wet slack, saline-influenced slack etc.). The slacks are considered an important habitat for the Annex II species *Petalophyllum ralfsii* (Petalwort) and the Natterjack Toad (*Bufo calamita*).

The following list of typical dune slack species that were recorded at Inch are taken from a recent report (Gaynor, 2003). They include *Juncus articulatus* (Jointed rush), *Juncus maritimus* (Sea rush), *Salix repens* (Creeping willow), *Salix cinerea* (Grey willow), *Mentha aquatica* (Water mint), *Potentilla anserina* (Silverweed) and *Prunella vulgaris* (Selfheal), along with typical moss species - *Bryum capillare*, *Calliergonella cuspidata*, *Drepanocladus aduncus* and *Campylium stellatum*. Other species that are common in the slacks are *Agrostis stolonifera* (Creeping bent grass) and *Cynosurus cristatus* (Crested dog's tail). Where these flat slack areas emerge along the eastern seaboard of Inch *Ulex europaeus* (Gorse), *Senecio jacobaea* (Common ragwort) and *Molinia caerulea* (Purple moor grass) are also found.

The quality and extent of the dune slacks are extremely important in an Irish context. They are similar to east coast slacks, but with a number of notable differences, e.g. the east coast species *Juncus acutus* is replaced by *Juncus maritimus*. Curtis (1991b) considers slacks in the south-west, like those at Inch, to be important in terms of understanding the formation and structure of dune systems in Ireland, as they appear to be intermediate between typical east coast systems and those found along the west and north coast.

### **Mobile Dunes (H2120)**

The frontal ridges are highly mobile and dominated by the typical species - *Ammophila arenaria* (Marram grass). Companion species include *Eryngium maritimum* (Sea holly), *Carex arenaria* (Sand sedge), *Senecio vulgaris* (Groundsel), *Taraxacum* agg. (Dandelion) and *Cakile maritima* (Sea rocket). The area around the southern tip is particularly good for this habitat type. Here the spit is actively accreting and displays a band of fresh *Ammophila arenaria* (Marram grass) up to 60m wide in places. This represents one of the best examples of mobile dunes in Ireland.

### **Embryonic Dunes (2110)**

Inch strand has particularly well-developed foredunes along its entire length and is one of the few west coast systems where there is active foredune development. This is rare in Ireland (Curtis 1991b). In some places along the strand the belt of foredunes is 20 metres in width. Sand is trapped by this vegetation, leading to the growth of sand hills up to 1m in height. These embryo dunes are highly dynamic and continually on the move. Typical species include *Elytrigia juncea* (Sand couch) and *Leymus arenarius* (Lyme grass). Sea rocket (*Cakile maritima*) and *Euphorbia paralias* (Sea spurge) also occur in this habitat.

### **Annual vegetation of driftlines (H1210)**

Strandline communities dominated by annual species are well developed at Inch strand, and extend almost continuously along the western side of Inch spit. The flora displays excellent representativity, with species such as *Salsola kali* (Prickly saltwort), *Cakile maritima* (Sea rocket), *Atriplex* spp. (Orache) and *Honckenya peploides* (Sea sandwort) growing in profusion. This habitat is subject to some damage from recreational pressure, particularly towards the neck of the spit where recreational activity is greatest.

### **Perennial vegetation of stony banks (H1220)**

Inch spit has developed over a shingle bar. Notwithstanding this, perennial vegetation of stony banks is not well developed nor is it shown on the map (#67). The underlying shingle is exposed in places within the dune slacks, particularly those towards the southern tip. The vegetation cover is sparse, with *Honckenya peploides* (Sea sandwort) being the most commonly encountered species. The rare species *Crambe maritima* (Sea kale) and *Lathyrus japonicus* (Sea pea) have historically been recorded from this habitat at Inch.

## **IMPACTS**

The greater part of the spit is occupied by the fixed dunes and dune grassland, which is in private ownership and is grazed for much of the year by sheep and cattle. Supplementary

feeding is also carried out. There are, however, proposals to convert a large portion of the site into a golf course. Following an ecological assessment of the site it was recommended that the golf course should not be developed anywhere at Inch spit (K. Gaynor, 2003).

Other impacts and activities which are known to occur within the sand dune system at Inch are listed in Table 70B, although as the site was not visited it is possible that others may occur. One of the most significant activities that impacts on the dunes is grazing (code 140). The MPSU plan for the cSAC indicates that cattle graze the dunes during the summer and parts of the winter, while sheep are allowed to graze the dune system for the entire year. In addition, owing to the quality of the grazing, supplemental feeding is carried out which exacerbates damage to fragile dune grassland, although this damage is localised.

**Table 70B** Intensity and impact of various activities on sand dune habitats at Inch

<b>EU Habitat Code<sup>1</sup></b>	<b>Activity Code<sup>2</sup></b>	<b>Intensity<sup>3</sup></b>	<b>Impact<sup>4</sup></b>	<b>Area affected/ha</b>	<b>Location of Activity<sup>5</sup></b>
H2130	140	A	1	Unknown	Inside
H2120	140	A	1	Unknown	Inside
H2190	140	A	1	Unknown	Inside
H2170	140	A	1	Unknown	Inside
H2130	490	C	-1	0.177	Inside
H2130	501	C	-1	Unknown	Inside
21BB	622	B	-1	Unknown	Inside
H2130	623	B	-1	Unknown	Inside
H2120	623	B	-1	Unknown	Inside
H2130	810	B	-1	Unknown	Inside
H2130	954	C	-1	Unknown	Inside

<sup>1</sup>EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.

<sup>2</sup> Description of activity codes are found in Appendix 3

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

<sup>4</sup> Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence

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

The spread of invasive species (code 954), largely *Ulex europaeus* (Gorse) is evident from the aerial photograph on the eastern side of the spit. It appears that much of the gorse is associated in drier ground around the drainage ditches (code 810) that are also visible on the aerial.

The western side of Inch is popular with recreational users. A small carpark (code 490) is located at the north-western end of the site. And although the beach is soft in places, it is possible to drive and park on the beach. While the soft sand is not suitable for cars, quad

bikes (code 623) are becoming more popular as a recreational activity particularly when the tide is out. The quads can strandline vegetation and undermine foredunes by creating trails which can result in bare sand or blowouts.

While paths and tracks (code 501) are not considered to be conspicuous in terms of pedestrian traffic within the dunes, a number of trails are clearly visible on the aerial photograph on the eastern side of the spit, running through the back of the fixed dunes and saltmarsh.

## **CONSERVATION STATUS**

Table 70A lists the conservation assessment that is considered to apply to the habitats that are known to occur at Inch. As the site at Inch was not visited in 2005, the assessment of conservation status is solely based on information supplied by Karen Gaynor (NPWS Research Branch) coupled with analysis of the year 2000 series aerial photographs.

### **Fixed Dunes (H2130)**

The sand spit at Inch is the largest single dune system in Ireland and is also considered one of the few remaining relatively intact dune systems. The area of fixed dunes at Inch is extensive, occupying an estimated (352.236ha). The extent is rated as *favourable* (Table 70C).

TABLE 70C CONSERVATION STATUS OF ANNEX I SAND DUNE HABITATS AT INCH

HABITAT <sup>1</sup>	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system <sup>2</sup>
	FAVOURABLE	Unfavourable - Inadequate	Unfavourable - Bad		
FIXED DUNES (H2130)	Extent / Structure & Functions* / Future Prospects			Favourable	Favourable - Maintained
DUNES WITH S. REPENS (H2150)	Extent / Structure & Functions* / Future Prospects			Favourable	Favourable - Maintained
DUNE SLACKS (H2190)	Extent / Structure & Functions* / Future Prospects			Favourable	Favourable - Maintained
MOBILE DUNES (H2120)	Extent / Structure & Functions* / Future Prospects			Favourable	Favourable - Maintained
EMBRYONIC DUNES (H2110)	Extent / Structure & Functions* / Future Prospects			Favourable	Favourable - Maintained
ANNUAL STRANDLINE (H1210)	Extent / Structure & Functions* / Future Prospects			Favourable	Favourable - Maintained

<sup>1</sup> EU Codes as per Interpretation Manual

<sup>2</sup> Ratings are Favourable (Enhanced, Maintained, Recovered, Declining), Unfavourable (Recovering, Unchanged, Declining) and Destroyed (Partially destroyed, Completely destroyed and Unknown)

\* Structure and functions assessment is based on Best Scientific Judgement as monitoring stops were not carried out

The structure and functions is rated as *favourable* (Table 70C). Gaynor (2003) has reported on the fixed dunes at Inch, that they have “a rich and diverse flora that is fully representative” of Irish fixed dunes. In addition blowing sand and areas of bare sand are an integral feature of this dynamic site.

Unless there is a radical change to the management or land use practice at the site, the future prospects for the fixed dunes are considered *favourable* (table 70C).

Inch strand has been recognised as an important area of ecological interest given the extent and quality, in particular, of its fixed dune vegetation. The overall EU conservation assessment for the fixed dune habitat at Inch is *favourable*, which corresponds to *favourable-maintained* under the proposed Irish assessment scheme (Table 70C).

#### Dunes with *S. repens* (H2150)

Although only a single area of this habitat is shown at Inch (Map 67), dunes with *S. repens* are known to be more extensive at Inch and occurs in a vegetation mosaic that is closely

associated with the dune slacks, particularly around the perimeter and extending upslope on mature dune ridges (K. Gaynor - NPWS, pers. comm.). Therefore their extent is rated as *favourable* (Table 70C).

The structure and functions are assessed to be *favourable* owing to the range and condition of species that have been noted during a site survey by Gaynor (2003).

The future prospects are rated as *favourable* (Table 70C). It has been suggested that the current grazing regime has not had any undue impact on the extent of the creeping willow.

Overall, the EU conservation assessment for the dunes with *S. repens* is *favourable*, which under the Irish assessment scheme is *favourable-maintained* (Table 70C).

### **Dune Slacks (H2190)**

Dune slacks are widely distributed throughout Inch and as estimated from the attached habitat map, range in size from 0.265ha to 5.7ha. Therefore in terms of extent they are rated as *favourable* (Table 70C).

Given the number and variety of discrete dune slacks that are recognised from Inch, and the typical slack flora that as outlined in the EU interpretation manual, the structure and functions are rated as *favourable* (Table 70C).

The future prospects for this habitat are currently rated as *favourable* (Table 70C). The current grazing regime coupled with the hydrological conditions are unlikely to change greatly in the near future. This would, however, not be the case if the golf course were to be developed on the sand dunes system.

The condition and range of slacks that occur at Inch is nationally important and the EU conservation assessment is *favourable*. This equates to *favourable-maintained* (Table 70C) under the proposed Irish conservation assessment scheme.

### **Mobile Dunes (H2120)**

The extent of mobile dunes is rated as *favourable* (Table 70C). Unlike the majority of sand dune systems around the country, Inch spit is actively accreting and continues to accumulate extensive deposits of sand. Indeed, Gaynor (2003) estimates that the mobile dunes are up to 60m wide in places.

The structure and functions are rated as *favourable* (Table 70C). The front of the dune ridge is highly mobile and dominated by the characteristic suite of species typically associated with the habitat. Freshly accumulated sand is quickly vegetated by *Ammophila arenaria* (Marram).

The future prospects of the mobile dunes are positive as considerable volumes of shifting sand are recorded from the Spit. For this reason the future prospects are rated as *favourable* (Table 70C).

As the three components of conservation status assessment are *favourable*, the overall assessment for the mobile dunes is *favourable* (Table 70C). Although the mobile dunes are accreting, the comparable Irish conservation assessment is *favourable-maintained* rather than *favourable-enhanced* as there is no quantitative data to compare the changes with.

### **Embryonic Dunes (H2110)**

Considerable dynamism has been reported for the foredune community (Gaynor, 2003). The foredunes occur along much of the frontline at Inch. For this reason, they are rated as *favourable* for extent (Table 70C).

Species characteristic of embryonic dunes are well developed and show vigorous growth in this highly dynamic habitat. Given the extent and condition of the habitat, the structure and functions are rated as *favourable* (Table 70C).

Given the relative size of this site and the volume of available sand, the foredunes future prospects are considered *favourable* (table 70C).

Overall, the EU conservation assessment for the embryonic dunes is *favourable*, which under the proposed Irish conservation scheme is *favourable-maintained* (Table 70C).

### **Annual Strandline (H1210)**

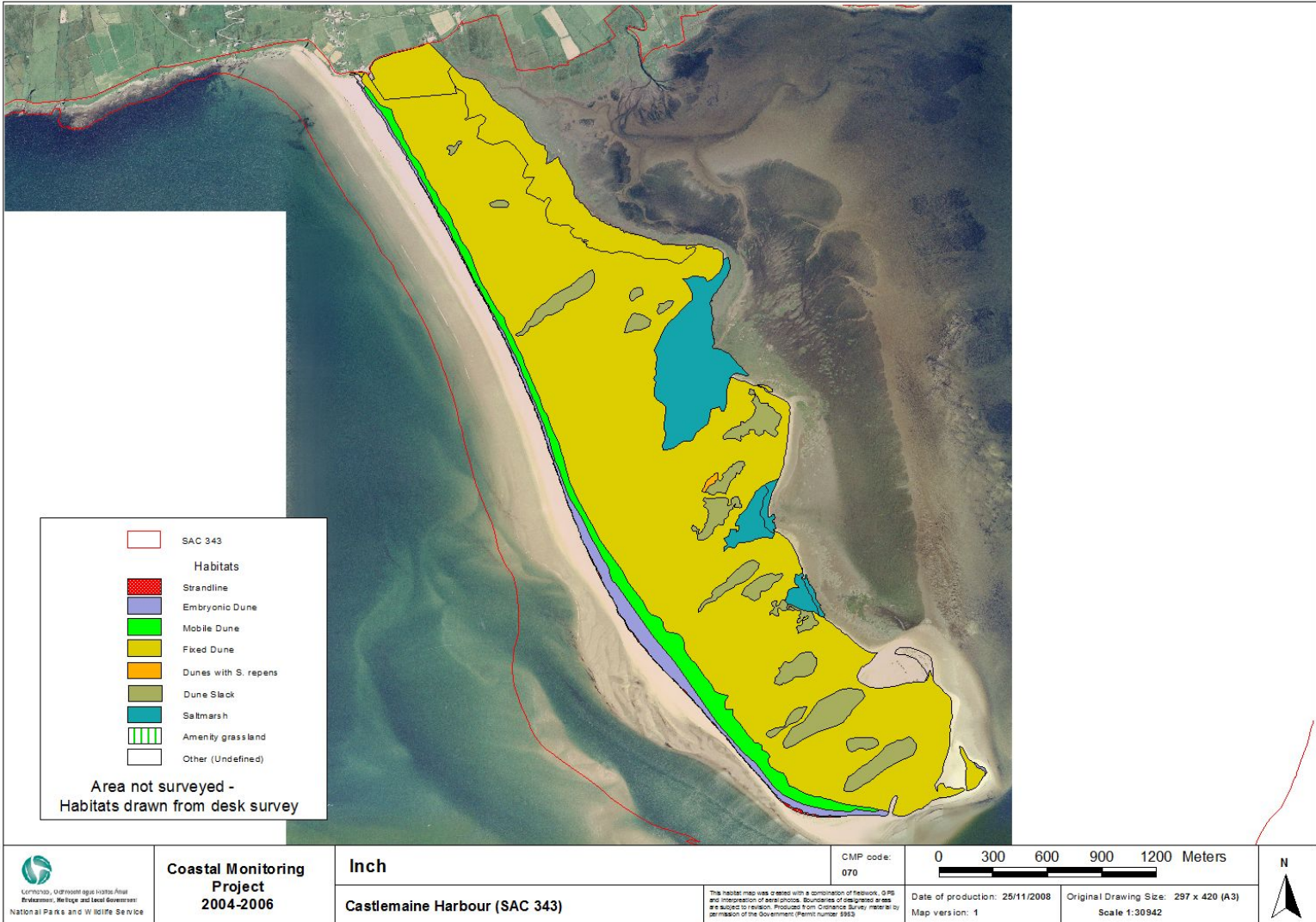
The extent of the annual strandline is rated as *favourable* (Table 70C), owing to the near continuous presence of the habitat along much of the front of the sand spit.

The presence and vigour of the annual vegetation that has previously been recorded along the front of Inch spit is consistent with a *favourable* structure and functions rating (Table 70C).

Although previous reports suggest that the strandline communities at Inch are prone to recreational damage, the future prospects are rated as *favourable* (Table 70C), given the extent of the habitat in areas that are rarely impacted.

The overall EU conservation status assessment for the habitat is *favourable* (Table 70C). This assessment is comparable with *favourable-maintained* under the proposed Irish scheme.





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

### SITE DETAILS

CMP05 site name: **Rosbehy**                      CMP05 site code: **068**                      CMP map No.: **65**  
County: **Kerry**   Discovery map: **78**                      Grid Reference: **V 064 093**  
6 inch Map No: **Ke 055 & 063**  
Aerial photographs (2000 series): **O 5986-C; O 6031-A; O 6031-C; O 6076-A**  
NPWS Site Name: **Castlemaine Harbour**  
NPWS designation:      pNHA: **343**      cSAC: **343**      SPA: **4029**  
Other designations: **Blue Flag Beach**      ; **Wildfowl sanctuary**  
Ranger Area: **Southwest**  
MPSU Plan: **Draft 2, Public Consultation 29/03/00**  
Report Author: **Kieran Connolly**

### SITE DESCRIPTION

Rosbehy is a spit extending into Dingle Bay from a point on the southern shore of the Bay, approximately 2.5km from Glenbeigh town. The spit extends northwards for approximately 4 km, and consists of a shingle bar, over which an extensive sand dune system has formed. Although quite narrow where it adjoins the mainland, the spit broadens to over 500m at the widest point.

Rosbehy is within Castlemaine Harbour cSAC, which consists of the whole inner section of Dingle Bay, and also estuarine stretches of the River Maine and the River Laune. The cSAC includes the spit of Inch, which extends from the northern shore of the Bay, and holds one of the finest dune systems in the country. Although not surveyed during this project, it is included in the present report as site no. 70. The rare bryophyte *Petalophyllum ralfsii*, an Annex II species of the EU Habitats Directive is known from the dunes at Inch, while *Crambe maritima* (Sea kale) and *Lathyrus japonicus* (Sea pea) have also been recorded.

A third shingle bar in the cSAC extends northwards from Cromane, but does not hold an extensive sand dune system, such as those at Inch and Rosbehy.

Most of the cSAC consists of intertidal sand and mudflats, although it is chiefly notable for the presence of fixed dunes with herbaceous vegetation and residual alluvial forest with Alder and Ash, both priority Annex I habitats. Most of the sand dune habitat at Rosbehy is accounted for by fixed dunes, while several other Annex I sand dune habitats are also present (Table 68A). On the east side of the spit, the sand dune habitats grade into saltmarsh and mudflats, while

on the west side there is a broad sandy beach known as White Strand. The beach was awarded a Blue Flag in 2005, indicating that certain minimum standards of water quality and other criteria such as safety provisions and environmental objectives had been met.

Table 68A Areas of EU Annex I habitats mapped at Rosbehy

<b>EU Code</b>	<b>EU Habitat</b>	<b>Area (ha)</b>
H1210	Annual vegetation of driftlines	0.735
H1220	Perennial vegetation of stony banks	0.050
H2110	Embryonic shifting dunes	0.792
H2120	Shifting dunes along the shoreline with <i>Ammophila arenaria</i>	10.418
H2130	Fixed coastal dunes with herbaceous vegetation	99.072
H2190	Humid dune slacks	1.831
	<b>Total Sand dune</b>	<b>112.898</b>

#### **Fixed Dunes (H2130)**

The fixed dunes at Rosbehy are known to be less diverse than those at Inch, which may be at least partly attributable to a lack of grazing over the years. Much of the fixed dunes are dominated by *Ammophila arenaria* (Marram), with only very limited areas of *Festuca*-dominated grassland. However, many of the typical species are found, including *Festuca rubra* (Red fescue), *Galium verum* (Lady's bedstraw), *Hypochaeris radicata* (Cat's ear), *Linum catharticum* (Fairy flax), *Luzula campestris* (Field wood-rush), *Plantago lanceolata* (Ribwort Plantain), *Polygala vulgaris* (Common milkwort), *Trifolium repens* (White clover) and *Veronica chamaedrys* (Germander speedwell).

While stock grazing of the dunes has been light over recent years, there is clearly a large rabbit population, as evidenced by the abundant burrows and scrapings. The central part of the spit is marked as a rabbit warren on the old 6" map.

There is a rich lichen and bryophyte flora throughout the fixed dunes. The more commonly occurring moss species include *Rhytidiadelphus squarrosus*, *R. triquetrus*, *Scleropodium purum* and *Tortula ruralis* ssp *ruraliformis*, while *Cladonia* spp. and *Peltigera* spp. lichens were common.

#### **Annual Vegetation of Driftlines (H1210)**

Annual strandline habitat was limited to two separate areas – one on the northwest of the spit, extending for approximately 500m, and a second near the tip of the spit, approximately 150m

long. Mechanical cleaning or scraping of the beach is not currently practised at Rosbehy, which favours the establishment of strandline vegetation.

The most common species in the habitat were *Cakile maritima* (Sea rocket) and *Salsola kali* (Prickly saltwort).

### **Shingle Strandline (H1220)**

The spit dune system is underlain by shingle, but currently very little exposed shingle with a characteristic flora may be seen. An extensive unvegetated shingle beach extending for a considerable distance from the south end of the site, has been all but destroyed by the alteration of the substrate for the provision of a car parking area for beach users.

A very small patch of shingle strandline vegetation, amounting to 0.050 ha was mapped on the east side of the spit. Because of its almost negligible extent, monitoring stops were not carried out, nor was the conservation status of the habitat assessed.

### **Embryonic dunes (H2110)**

Embryonic dunes are absent along almost the entire length of the spit. They are currently restricted to just a small stretch of approximately 400m at the northern tip, where there is good foredune development. Recreational pressures, particularly at the southern end of the site where such pressures are greater, adversely affect embryonic dune distribution. In these areas, erosion has in places extended into the fixed dunes. Monitoring stops were not carried out in the habitat, due to its very limited extent.

### **Mobile dunes (H2120)**

Mobile dunes are absent along a considerable portion of the spit, particularly at the southern end, where recreational pressures are greatest. However, along the northern end and at the tip recurve of the spit, there is a long continuous stretch of mobile dunes, which in places exceeds 50m in width. The recent rates of accretion are quite striking in a number of areas. A smaller, narrow band was also mapped in the southern half of the spit, while some additional small patches of mobile dune vegetation were mapped on the western side of the spit. Some of the habitat was accreting over previously eroded fixed dune. Characterised by the presence of *Ammophila arenaria* (Marram), the habitat also commonly included *Eryngium maritimum* (Sea-Holly) and *Euphorbia paralias* (Sea spurge).

### **Dune Slacks (H2190)**

Thirteen discrete dune slacks were mapped, which amounted in total, to 1.831 ha in area (Table 68A). Most of the slacks were closely adjacent in the wide central part of the spit. The

3 largest slacks in this area collectively exceeded 1 ha in area, while most of the others were individually less than 0.1 ha. One large slack of 0.416 ha, was mapped in the southern end of the spit.

Although Rosbehy in general is somewhat undergrazed, the dune slacks appeared to be more heavily grazed by rabbits and sheep, than the surrounding fixed dunes. Rabbit burrows and scrapings were noticeably more abundant in the slacks than elsewhere. The result of this grazing was that the slack vegetation was tightly cropped throughout the site.

Creeping willow, *Salix repens* is common in dune slacks at Rosbehy, and previous reports have suggested the existence (based on the advice of NPWS staff) of the Annex I habitat - Dunes with *Salix repens*. However, the difficulties in distinguishing this habitat from humid dune slacks, mostly through the considerable overlap in companion species of *S. repens* associated with both habitats, were acknowledged, as was the fact that the habitat needs further investigation before more definitive habitat delimitations are established. All habitat at Rosbehy in which *S. repens* was found was referred to humid dune slacks, although certain areas may be identified which could be equally well accommodated in Dunes with *S. repens*. Several of the slacks include species such as *Hydrocotyle vulgaris* (Marsh pennywort) and *Calliergonella cuspidata* (Spear moss) that are characteristic of wet slacks, whereas other areas, dominated by species typical of dry mature slacks or fixed dune, are more similar to typical Dunes with *S. repens* habitat.

Common typical species in the dune slacks included *Carex arenaria* (Sand sedge), *Carex flacca* (Glaucous sedge), *Linum catharticum* (Fairy flax), *Prunella vulgaris* (Selfheal), *Spiranthes spiralis* (Autumn lady's-tresses) and *Juncus maritimus* (Sea rush). Other species found regularly throughout the dune slacks, included several such as *Euphrasia officinalis* agg. (Eyebright), *Galium verum* (Lady's bedstraw), *Leontodon saxatilis* (Lesser hawkbit), *Lotus corniculatus* (Common bird's-foot-trefoil) and *Plantago lanceolata* (Ribwort Plantain), which are regarded as typical fixed dune species.

The more common moss species in humid dune slacks were *Rhytidiadelphus triquetrus*, *R. squarrosus*, and *Tortula ruralis* ssp *ruraliformis*

Yellow bartsia, *Parentucellia viscosa* and *Cicendia filiformis* (Yellow centauray) have previously been recorded in the dune slacks at Rosbehy, but were not seen in the present survey.

## **IMPACTS**

Activities observed or known to be impacting on the sand dune habitats at Rosbehy are shown in Table 68B.

Rosbehy has been undergrazed for some time. The NATURA 2000 report refers to sheep grazing by 50 – 100 animals between September and April, and overwintering of 20 cattle. Previous reports also refer to a long absence of stock grazing at the site. Undergrazing (code 149) has resulted in low plant species diversity at the site. Much of the fixed dunes are Marram-dominated, with only very limited areas of short turf.

**Table 68B** Intensity and impact of various activities on sand dune habitats at Rosbehy

<b>EU Habitat Code<sup>1</sup></b>	<b>Activity Code<sup>2</sup></b>	<b>Intensity<sup>3</sup></b>	<b>Impact<sup>4</sup></b>	<b>Area affected/ha</b>	<b>Location of Activity<sup>5</sup></b>
H2130	146	B	-1	5	Inside
H2130	149	A	-1	90	Inside
H1220	302	A	-2	4	Inside
H2130	421	C	-1	0.5	Inside
H2120	608	B	-1	0.5	Inside
H2130	608	A	-1	3	Inside
H2110	720	A	-1	2	Inside
H2120	720	A	-1	3	Inside
H2130	720	C	-1	5	Inside
H2110	900	B	0	4	Inside
H2120	900	B	0	5	Inside
H2130	900	B	0	4	Inside

<sup>1</sup>EU Codes as per Interpretation Manual. Code 21BB is an additional code used to signify the entire dune habitat.

<sup>2</sup> Description of activity codes are found in Appendix 3

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

<sup>4</sup> Impact is rated as: -2 = irreparable negative influence, -1 = repairable negative influence, 0 = neutral, +1 = natural positive influence and +2 = strongly managed positive influence

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

Although stock grazing levels are lower than is desirable from a conservation management point of view, the levels of rabbit grazing appear to be very high (code 146). Although this may be beneficial in helping to maintain some short turf grassland, the abundance of burrows is probably contributing to the negative affects of erosion in the more sensitive areas of the site.

The beach and dunes are in a popular holiday area, of which one of the consequences is the use of the dunes for camping and caravans (code 608). There is currently an unlicensed caravan/mobile home park at the south end of the site. Another large area was occupied by a scout encampment on the survey date. A few individual tents were also observed in the dunes. In addition to the disturbance and damage directly caused by caravans and mobile homes, associated damage, such as that of bonfire sites, was also observed. Occasional casual littering of household waste (code 421) was noted in the fixed dunes.

Because of the attractiveness of the site for recreational purposes, some quite severe damage has been caused to the sand dune habitats, particularly in those areas where amenity usage is greatest. Although natural erosion is thought to be a feature on the western side of the spit, the damage has certainly been exacerbated along the southern half of the spit, where pedestrian traffic and associated usage is most severe. Trampling and overuse (code 720) has negatively affected the distribution of foredune habitats and led to the erosion and slumping of fixed dune vegetation. There are also a number of well-worn tracks throughout the dunes in these areas. However, the primary impact on the south western edge of the spit, for both embryonic and mobile dunes, is natural erosion (code 900).

The shingle bank in the southwest part of the spit has been greatly altered, and all but destroyed as a potential habitat of interest, through the large scale levelling and reworking of the substrate to provide a car parking area (code 302).

## **CONSERVATION STATUS**

The overall conservation status assessment of each habitat at Rosbehy is based on a combination of *Extent*, *Structure & Functions*, and *Future Prospects* assessments (Table 68C).

The available information on Rosbehy, such as the NATURA 2000 report, is subject to interpretation, as most data refer to the total area of each habitat within the cSAC. In this case, Castlemaine Harbour also includes the extensive sand dune system at Inch. For this reason, much of the conservation assessment of Rosbehy is based on the current condition of habitats.

**Table 68C** Conservation status assessment of Annex I sand dune habitats at Rosbehy

Habitat <sup>1</sup>	EU Conservation Status Assessment			Overall EU conservation status assessment	Proposed Irish conservation status system <sup>2</sup>
	Favourable	Unfavourable - Inadequate	Unfavourable - Bad		
Fixed Dune (H2130)		Extent/ Structure & functions/ Future prospects		Unfavourable - Inadequate	Unfavourable – Unchanged
Annual Strandline (H1210)	Structure & functions	Extent/ Future Prospects		Unfavourable - Inadequate	Unfavourable – Unchanged
Embryonic Dune (H2110)	Structure & functions	Future Prospects	Extent	Unfavourable - Bad	Unfavourable – Unchanged
Mobile Dune (H2120)	Structure & functions	Extent/ Future Prospects		Unfavourable - Inadequate	Unfavourable – Unchanged
Dune Slack (H2190)	Extent/ Structure & functions/ Future Prospects			Favourable	Favourable - Maintained

<sup>1</sup>EU Codes as per Interpretation Manual

<sup>2</sup>Ratings are Favourable (Enhanced, Maintained, Recovered, Declining), Unfavourable (Recovering, Unchanged, Declining) and Destroyed (Partially destroyed, Completely destroyed and Unknown)

Details of the numbers and pass/failure rates of monitoring stops used to assess habitat structure & functions are shown in Table 68D.

**Table 68D** Pass/Fail results of monitoring stops for Annex I sand dune habitats at Rosbehy

Habitat	Monitoring stops		Conservation status
	Pass	Fail	
Fixed dune (H2130)	11	1	Unfavourable – Inadequate
Strandline (H1210)	4	0	Favourable
Mobile Dune (H2120)	4	0	Favourable
Dune Slack (H2190)	8	0	Favourable



## **Fixed Dune**

In places, particularly at the south end of the spit, erosion extends into the fixed dunes, and slumping of fixed dune vegetation has been observed. Although natural erosion is thought to be a feature of the site, it seems that the negative affects of erosion have been exacerbated in the areas of greater recreational pressure. For this reason, habitat extent is rated as *unfavourable – inadequate*.

Twelve monitoring stops, all but one of which passed the target criteria were carried out in the fixed dunes. Most stops did not satisfy the sward height target (no greater than 20 cm average height), but in all these cases, the typical species target of 6 species present was met. An excessive cover of negative indicator species – in this case *Cirsium arvense* (Creeping Thistle) – accounts for the failure of one stop to meet the required target. The overall pass rate of monitoring stops – lying between 1% and 25% indicates an *unfavourable – inadequate* rating for habitat structure and functions.

The future prospects of the fixed dunes are also thought to be *unfavourable - inadequate*. Although public ownership of the site (Kerry County Council) may protect the site from proposed developments, such as those that threaten Inch, certain standards have not been met with regard to maintaining the integrity of the site. Unlicensed caravan parks and uncontrolled camping have led to unsustainable pressures at the site. Fencing of sections of the dunes is required to aid their stabilisation and possible future enhancement, particularly in the southern end of the site. An increase in stock grazing levels would enhance species diversity over time, although there are apparently no plans to implement such a regime.

As all 3 elements of conservation status assessment are *unfavourable – inadequate*, the overall assessment is also *unfavourable – inadequate*.

The Irish conservation status assessment thought most appropriate is *unfavourable – unchanged*, as the site appears to have been quite stable in area and integrity of habitats over time.

## **Annual Vegetation of Driftlines (H1210)**

Strandline vegetation was present in only a limited portion of the site, indicating poor habitat zonation. Although no data to suggest a consistent decline in the habitat is available, it is likely that the negative affects of natural erosion on strandline (and other) habitats have been exacerbated by the impact of recreational pressures at the site. For this reason, the conservation status assessment for habitat extent is rated as *unfavourable – inadequate*.

All 4 monitoring stops in the annual strandline satisfied the necessary minimum criteria, indicating a *favourable* rating for habitat structure and functions.

The future prospects of annual strandline habitat are rated as unfavourable – inadequate, for similar reasons as those outlined for habitat extent. Although the habitat is ephemeral in nature and may vary considerably in extent from year to year due to natural processes, it is likely that heavy recreational pressures, particularly in certain parts of the site, will have an ongoing negative impact on the habitat.

As the 3 parameters for conservation status assessment are a combination of favourable and favourable – inadequate evaluations, the overall habitat assessment is unfavourable – inadequate.

In the absence of any data suggesting an ongoing decline in the condition of the habitat, the Irish conservation status assessment which best corresponds to the EU assessment is *unfavourable – unchanged*.

### **Embryonic dunes (H2110)**

Habitat zonation is quite poor at Rosbehy, particularly in the case of embryonic dunes, the distribution of which has been adversely affected by natural erosion, compounded by heavy recreational use. The habitat is currently present in only a very limited area. Consequently, habitat extent is rated as *unfavourable – bad*.

Monitoring stops were not carried out in the embryonic dunes, due to their very limited extent. Where present, however, the vegetation structure and function attributes were observed to be of the desired standard, as a result of which, the conservation assessment for structure and functions is *favourable*. The area in question has apparently been regarded as a zone of good foredune development for some time.

Because of the ongoing adverse affect of erosion and amenity pressures on the distribution of embryonic dunes, their future prospects are rated as *unfavourable – inadequate*. The evaluation would probably be more negative, were it not for the continued vitality of an area of foredune development near the tip of the spit.

As an *unfavourable – bad* evaluation is included among the 3 components of conservation status, that is the overall assessment that applies to the habitat.

As the embryonic dunes appear to have been in a similar condition for some time, in terms of habitat condition and extent, the Irish conservation status assessment which best corresponds to the EU assessment is considered to be *unfavourable – unchanged*.

### **Mobile dunes (H2120)**

Although the mobile dunes at Rosbehy are present over a considerably greater area than embryonic dunes, their distribution is still adversely affected to some degree by the negative impact of natural erosion compounded by high recreational pressures. For this reason the conservation status assessment for habitat extent is *unfavourable – inadequate*.

Four monitoring stops, all of which satisfied the target criteria, were carried out in the mobile dunes, indicating a *favourable* assessment for habitat extent.

As is the case with the embryonic dunes, the future prospects of mobile dunes are rated as *unfavourable – inadequate*, due to the ongoing adverse affect of amenity pressures on their distribution.

As the 3 parameters for conservation status assessment are a combination of *favourable* and *favourable – inadequate* evaluations, the overall habitat assessment is *unfavourable – inadequate*.

The Irish conservation status that best corresponds to the EU assessment is *unfavourable – unchanged*.

### **Dune Slacks (H2190)**

Habitat extent is rated as *favourable* for dune slacks at Rosbehy. The number of individual slacks and total area of habitat surveyed here, would seem to be at least equal to those observed in previous reports, although it should be borne in mind that previous area measurements were apparently based on less precise methods than those employed here. In addition, previous reports have suggested that some slack-type habitat would be more appropriately considered under 'Dunes with *Salix repens*'. Again, no precise estimations of area were provided.

Eight monitoring stops were carried out in humid dune slacks. All stops satisfied the necessary criteria, indicating a *favourable* structure and functions assessment.

The possibility of establishing suitable Natterjack toad habitat at Rosbehy has been investigated recently. It may be assumed that any such measures would be done in such a manner as to preserve the integrity of dune slacks.

The threat posed to humid dune slacks at Rosbehy from recreational activities is currently not significant. Most slacks are well removed from the areas of highest recreational pressures. They are also free from the threats posed by overgrazing and supplementary feeding which tend to occur in slacks in the southwest. For these reasons, the future prospects are considered *favourable*. It should be noted however, that previous studies of Rosbehy have listed a small number of rare or uncommon dune slack plant species that were not seen during the present survey. Disappearance from the site could be considered as a decline in the status of indicators of local distinctiveness, or be indicative of a decrease in the structural diversity of the habitat. The status of these species should be investigated during future site visits.

As all elements of conservation status assessment are *favourable*, that is the rating that applies to the habitat as a whole.

The Irish conservation status that best corresponds to the EU assessment is *favourable – maintained*.

