APPENDIX No. 15

Tawin

Extract from NPWS Salt Marsh Monitoring Programme Project 2006 as referenced by Dr. John Conaghan

Tawin Island

1 SITE DETAILS

SMP site name: **Tawin Island**	SMP site code: **SMP0009**
Site name (Curtis list): **Tawin Island**	CMP site code:
	Site No: (Curtis list): **123**
NPWS Site Name: **Galway Bay complex**	Dates of site visit: **27-28/07/2006**
NPWS designation cSAC: **268**	MPSU Plan: **old format**
pNHA: **268**	
SPA: **268**	
County: **Galway**	Discovery Map: **46/52** Grid Ref: **131780, 219260**
6 inch Map No: **Ga094, Ga102**	Aerial photos (2000 series): **03470-c, 03470a-d, 03519-a, 03519-b, 03519-d, 03520-a, 03520-c**

Annex I habitats currently designated for Galway Bay complex cSAC:

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

Other SMP sites within this cSAC/pNHA: **none in 2006 (19 Curtis sites listed in Galway Bay)**

Saltmarsh type: **Bay**	Substrate type: **Mud**

2 SITE DESCRIPTION

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

The island has a complex intricate coastal topography and there are barrier shingle/pebble bars on both sides of the island. These barriers partially enclose intertidal and subtidal areas between the island and the mainland and are possibly classified as lagoons. These barriers are broken in places towards the eastern side of the island and allow the tide to access the intertidal areas (lagoons). However, tide access is restricted so the tidal regime within the lagoons differs from that in Galway Bay. Behind the barriers there is a complex network of saltmarsh, intertidal and

grassland habitats that are dependant on elevation and topography. Saltmarsh is generally present along the internal shorelines but this habitat disappears in places and is replaced by rocky outcrops. There are numerous small islands and some larger islands in the intertidal area that also contain saltmarsh habitat, particularly on the north side of the bridge. Sheehy Skeffington and Wymer (1991) stated that the saltmarshes around Tawin Island formed mainly as a result of the sea following glacial till deposits, which were subsequently colonised by saltmarsh species with very little deposition of marine sediment.

Three Annex I habitats, *Salicornia* flats, Atlantic salt meadows (ASM) and Mediterranean salt meadows (MSM) are found at this site. All three are listed as qualifying interests for Galway Bay complex cSAC. Tawin Island is one of 19 saltmarsh sites recorded by Curtis and Sheehy Skeffington (1998) in Galway Bay. Most of the saltmarsh habitat at Tawin Island is situated within the cSAC. Most of the terrestrial parts of the island have been excluded from the cSAC and the coastal and intertidal habitats are included. Small strips along the landward boundaries are excluded unintentionally, as the 6 inch map was used to draw the cSAC site boundary. This map is slightly inaccurate in places and there are small errors in rectification between the 6 inch map boundaries and the actual boundaries as indicated by the 2000 aerial photo.

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

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

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

3 HABITATS

3.1 General description

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

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

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

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

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

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

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

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

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

*note that saltmarsh habitat continues outside the surveyed site.

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

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

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

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

3.3 Atlantic salt meadows (H1330)

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

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

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

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

Much of the ASM does not have a typical salt pan or creek topography. The best developed area is located to the south of the island. Saltmarsh has developed along

the southern side of the island and along the northern side of the storm beach barrier. Intertidal mudflats are situated between these two sides and widen towards the east. Towards the west the storm beach barrier meets the shoreline of the island and saltmarsh has developed along a small valley or hollow. The intertidal flats narrow to form a channel and several small pools that drain this area towards the east.

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

ASM saltmarsh is also situated along the northern side of the island behind the storm beach barrier. No intertidal flats have developed in this area and the saltmarsh is confirmed to a narrow zone between the barrier and the terrestrial land. This area has a complex topography with intricate mounds and hollows. The mounds contain dry coastal grassland and saltmarsh develops in the hollows. Occasionally there are small pools and channels in the centre of the hollows that act as drainage channels. There is no obvious connection to the shoreline in this area as the storm beach barrier is intact so this saltmarsh is probably flooded from the east. Alternatively this area may not be flooded but the water table may be affected by salt water. The saltmarsh is quite

difficult to map in this area because of the intricate topography. The vegetation is dominated by mid and upper saltmarsh plant communities. The vegetation is moderate-heavily grazed and Sea Aster and Lax-flowered Sea Lavender are reduced to tiny leaves.

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

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

northern side of the island to the southern side and saltmarsh is present on both sides of the channel. This channel divides the saltmarsh into an eastern and western half.

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

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

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

The north-east part of Tawin Island has a complex coastal mosaic along the shoreline. This contains a mosaic of saltmarsh, dry coastal grassland on mounds and rocky outcrops. The topography is very intricate and the actual saltmarsh habitat covers about 75% of the total mosaic area. The saltmarsh in this area is difficult to map due

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

3.4 Mediterranean salt meadows (H1410)

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

The shoreline outside the enclosures is moderate-steeply sloped. This has allowed some plant zonation to develop, although this does not affect the Sea Rush. At the seaward edge Red Fescue is not present. Sea Aster and Sea Plantain are more common with occasional Common Saltmarsh-grass and Glasswort. Species such as Silverweed (*Potentilla anserina*), White Clover (*Trifolium repens*), Sea Beet (*Beta maritima*), Creeping Bentgrass, Sea Wormwood and Spear-leaved Orache are found around the upper boundary. Occasionally Sea Rush is distributed above the high

water mark and this is indicated by the presence of more terrestrial species such as Dandylion (*Taraxacum* sp.) and Birdsfoot (*Lotus corniculatus*). The MSM transitions into dry coastal grassland at the landward boundary in places. Occasionally the dry stonewall/embankment marks the upper edge of the saltmarsh.

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

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

4 IMPACTS AND ACTIVITIES

4.1 Saltmarsh habitats

This site covers a large area and is quite fragmented. This means that impacts and activities on the saltmarsh generally affect parts of the saltmarsh and do not affect the whole site. The main activity is grazing (Table 4.1). Most of the saltmarsh is grazed by cattle and or sheep. The coastal area is held in commonage for farmers on the island but this seems to have been divided up as the grazing level varies in different sections. Some areas are grazed by cattle but sheep are the most common grazers. Overall, the grazing level is moderate and has created generally short swards in the ASM. One indication of the level of grazing is that the adjacent dry coastal grassland has a taller sward (5-20 cm). Livestock seem to prefer the saltmarsh vegetation compared to the adjacent terrestrial grassland in places. Much of the upper saltmarsh zone has a taller sward and this is because the Sea Wormwood shields the other vegetation somewhat. There are other patches of taller swards in the MSM area and around other parts of the ASM. Overgrazing was not a significant problem at the time of the survey. There are some areas with high levels of poaching, but this type of damage is not extensive. The lower saltmarsh zones are generally the most affected

by poaching. Poaching is being caused by cattle with areas grazed by sheep not poached significantly.

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

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

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

A comparison of the 1920's 6 inch map to the 2000 aerial photo indicates that the shoreline around Tawin Island has not changed significantly. This includes the coastal areas within the storm beach barriers. There has been no significant erosion of saltmarsh (900) or loss of extent. There are signs of erosion present along some of the seaward edges with mud balls and frequent saltmarsh cliffs. It is difficult to interpret if this is related to grazing or is poaching induced. Other coastal areas, particularly in the mosaic areas also show signs of erosion with small patches of saltmarsh

vegetation on exposed mud overlying exposed bedrock. The mud layer that the saltmarsh vegetation has developed on seems to be eroding away and exposing the bedrock in places. Again it is difficult to interpret if this process is being exacerbated by grazing or if it is a recent natural phenomenon. Small islands present in the sheltered intertidal area to the north of the island where mapped on the 6 inch map and have not changed significantly so this may be an indication that erosion is not a significant process at present.

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

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

4.2 Adjacent to the saltmarsh habitats

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

There has been some dumping of gravel and stones in the north-west part of the island. This is presumably being used to repair gaps in the storm beach barrier. The local council have also carried out coastal protection works on habitats adjacent to saltmarsh (871) along the road. Coastal protection works may impact on the

saltmarsh by increasing erosion. The MPSU conservation plan noted that some of the storm beach barrier has been excavated (302) to extract gravel and aggregate (estimated to be a minor area < 0.01 ha).

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

EU Habitat Code[1]	Activity code[2]	Intensity[3]	Impact[4]	Area affected (ha)	Location of activity[5]
1310	140	C	0	1.08	Inside
1330	140	B	-1	38.33	Inside
1330	143	A	-1	5.4	Inside
13s	422	C	-1	< 0.001	Inside
1330	501	C	-1	< 0.1	Inside
1330	511	C	-2	< 0.01	Inside
1330	900	C	0	38.33	Inside
1410	140	C	-1	1.53	Inside
13s	120	C	0	17	Outside
13s	140	C	0	40.94	Outside
13s	302	C	0	< 0.01	Outside
13s	401	C	0	40.94	Outside
13s	403	C	0	40.94	Outside
1330	502	C	0	3.8	Outside
1330	871	C	-1	< 0.01	Outside

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

5 CONSERVATION STATUS

5.1 Overall Conservation Status

Overall this site has a moderate or *unfavourable-inadequate* conservation status (Table 5.1). Four stops failed out of twenty-three monitoring stops divided between the three habitats. The most significant activity on this site is sheep grazing. The overall grazing pressure on this site is moderate but the intensity of the grazing pressure varies as the saltmarsh is quite fragmented and is spread over a larger area. This has created a typical close-cropped sward over much of the saltmarsh. In most of the site the grazing intensity is not negatively affecting the saltmarsh. Some local areas are heavily grazed by sheep and some areas are also heavily poached by cattle, particularly the lower saltmarsh zones.

The medium-term future prospects of natural landward saltmarsh migration in response to sea level rise are moderate. However, these are very general predictions.

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

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

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

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

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

5.2.1 Extent

The extent of this habitat is assessed as *favourable*, in the absence of no information on the previous extent of this habitat at this site. This habitat was added as a qualifying interest to the cSAC because previous surveys had recorded Glasswort and

Annual Sea-blite on saltmarshes in Galway Bay and it was assumed that this habitat was present.

5.2.2 Habitat structure and functions

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

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

5.2.3 Future prospects

The future prospects of this habitat are assessed as *favourable*. This assessment assumes that the current management activities and level of impacts continue in the near future. There are no major impacts or activities affecting this habitat. The sediment banks that this habitat colonises are however prone to sudden erosion or accretion in response to geomorphological cycles or storm events.

5.3 Atlantic salt meadows (H1330)

5.3.1 Extent

The extent of this habitat is assessed as *favourable*. There is no evidence to suggest that there has been any recent loss of extent due to erosion or other impacts. The MPSU conservation plan noted that there had been some reclamation of coastal grassland including saltmarsh in Tawin West (pre-1992). However, there were no signs of this reclamation work during the survey. The extent of any habitat lost must be quite small otherwise the reclamation would have been noted. A comparison of the 2000 aerial photo to the 1920s 6 inch map indicates that there has been no

significant loss of extent of saltmarsh during this period. Even though there are signs of erosion along the seaward edge of much of the ASM there have been no significant areas of saltmarsh that have been eroded away. Reports of increased tidal inundation over farmland and coastal land that previously was never affected by the tide may actually have increased the extent of saltmarsh in recent times.

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

5.3.2 Habitat structure and functions

The structure and functions of this habitat are assessed as *unfavourable-inadequate*. Nineteen monitoring stops were carried out around the island and fifteen stops passed (78%). The other four stops did not reach targets for levels of grazing and poaching, and bare substrate cover. These four stops are located in areas that have been either grazed very heavily by sheep or have been poached and grazed heavily by cattle. The damaged sections cover an area of 5.2 ha (15% of the total ASM). The sward height is generally quite low in the lower and mid marsh zones. However, the upper marsh frequently has a taller sward due to the presence of Sea Wormwood. O'Connor (1992) stated that the grazing levels were not excessive and grazing is likely to increase the species diversity of the saltmarsh communities.

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

Other attributes such as plant zonation and plant diversity reached their targets. This site has a typical species diversity. Plant zonation was particularly well-developed and was dependant on elevation. The saltmarsh, particularly along the northern side of the island has a very complex topography and forms a mosaic with coastal

grassland on the tops of mounds, exposed rock outcrops and patches of pebbles and cobbles. Internal zonation is particularly well-developed along the sides of these mounds. The mid marsh and upper marsh communities are the most abundant. The lower and pioneer saltmarsh communities are less frequent and this is related to the topography of the site. There are no accreting ramps for a pioneer zone to develop. The lower and pioneer zones are best developed along some of the shallow channels and hollows that drain the various saltmarsh sections but their extent is quite small. Occasionally there are patches of Glasswort and Annual Sea-Blite that are situated on stony substrates at the seaward edge of the saltmarsh.

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

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

This site has several features of local distinctiveness. The site is notable for the abundance of Sea Wormwood along the upper boundary. This species has a scattered distribution in Ireland and was only found recently in eight 10 km^2 squares around the coast of Ireland (Preston *et al.* 2002). Webb *et al.* (1996) described its distribution as rare and very local although it is not recorded as a rare species in The Red Data Book (Curtis & McGough 1988).

Sea-purslane (*Atriplex portulacoides*) is also present at this site and was recorded at two locations. This is another species of local distinctiveness. This species is mainly distributed along the eastern coast of Ireland and is only found in six 10 km^2 squares along the west coast. Curtis and Sheehy-Skeffington (1998) have discussed the distribution of this species and hypothesised that its lack of abundance on the west coast compared to the east coast is related to the higher levels of grazing on west coast saltmarshes. O'Connor (1992) noted that the western location was ungrazed during that survey and that grazing can deplete this species. This area is currently being grazed and there is some heavy poaching by cattle in parts. Long-term grazing is likely to affect the abundance of this species. Sea-purslane is distributed on exposed rock at the western location and this may shield it somewhat from heavy grazing. This species was also noted during the survey outside the survey area along the shoreline at Lacanaloy Creek in Mweeloon.

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

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

5.3.3 Future prospects

The future prospects of this habitat are assessed as *unfavourable-inadequate*. This assessment assumes that the current management activities and level of impacts continue in the near future. Grazing is the main impact on this site but the intensity varies. Most of the site has moderate grazing levels and they are not affecting the

saltmarsh significantly. There are some localised areas that have been damaged by heavy grazing by sheep or cattle. Some reduction in grazing is required in these localised areas to allow these areas to recover.

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

5.4 Mediterranean salt meadows (H1410)

5.4.1 Extent

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

5.4.2 Habitat structure and functions

The structure and functions of this habitat is assessed as *favourable*. Four monitoring stops were carried out in this habitat and they all passed. All the attributes reached their targets. This habitat has a typical species assemblage. One distinctive feature is that Sea Rush is not as abundant compared to other sites and Red Fescue and other salt marsh species are prominent parts of the vegetation. Plant zonation is a notable feature in this habitat and zonation is not always seen because the habitat is generally quite uniform and dominated by Sea Rush. This habitat is grazed by cattle but the grazing intensity was low and there were no signs of poaching. There are few other impacts on this habitat.

The MSM is situated on a relatively steep slope. Typical saltmarsh topography is not well-developed and only a few salt pans are present, but this is due to its situation on a relatively steep slope. There is a natural transition to dry coastal grassland at the landward boundary. No Common Cordgrass (*Spartina anglica*) was recorded in this habitat.

5.4.3 Future prospects

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

near future. Grazing is the main impact on this site but its current intensity is low. There is no evidence that the habitat extent will be significantly reduced in the near future.

6 MANAGEMENT RECOMMENDATIONS

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

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

7 REFERENCES

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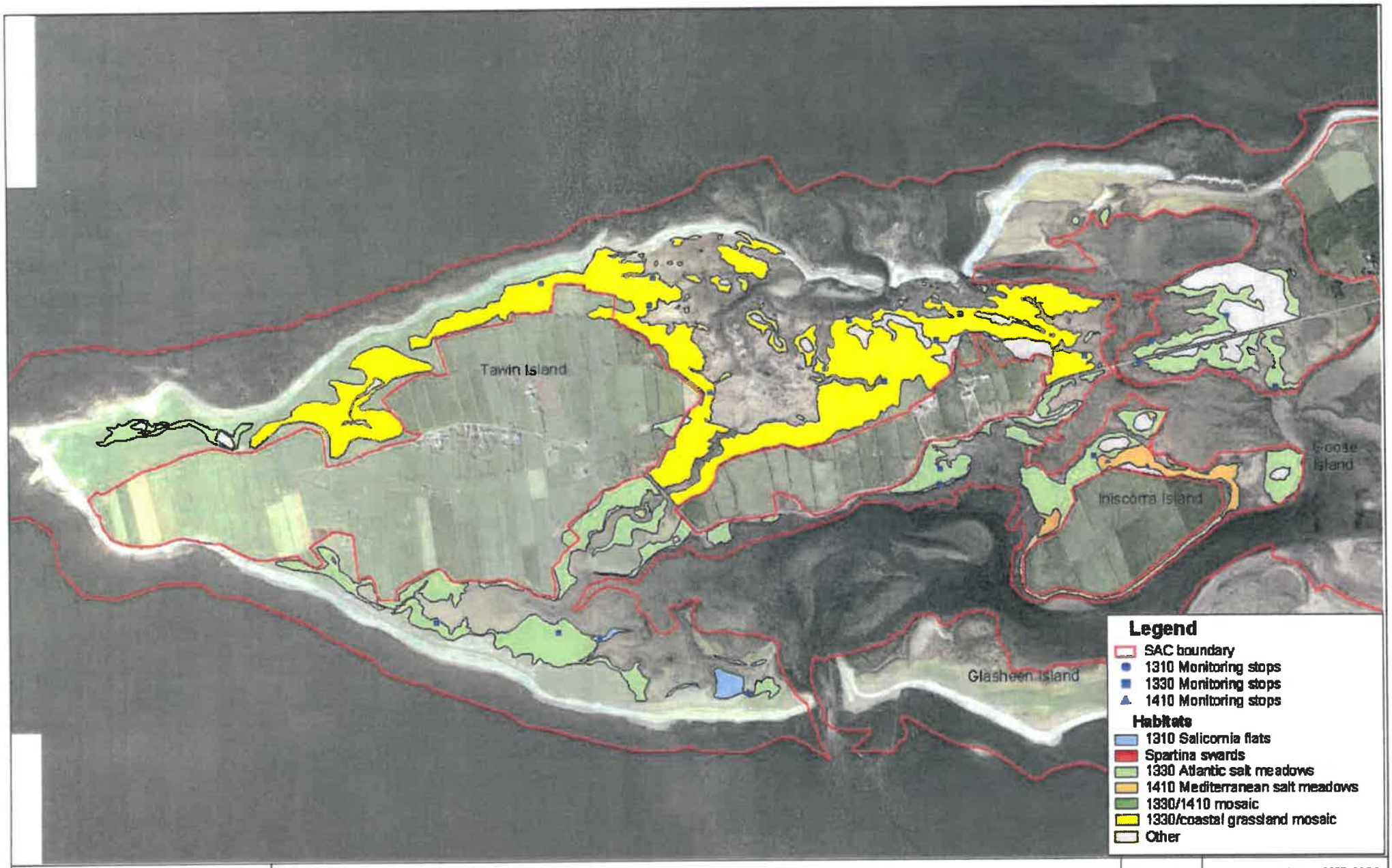

Saltmarsh Monitoring Project

Tawin Island

Galway Bay Complex cSAC (000268)

SMP Code: SMP0009

Map produced by: SMP 2006

Map Version: 1

0 0.2 0.4 0.6 0.8 Kilometers N

Scale: 1:9548