The Ecology of Poole Harbour
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4. The Vegetation of Poole Harbour

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The vegetation of the 423 ha of saltmarshes present within Poole Harbour is described. The formation of the saltmarsh is linked to the complex tidal regime and to the invasion of *Spartina anglica*. Three saltmarsh zones, lower, middle and upper, are defined and within each zone the different plant communities are described in the context of the National Vegetation Classification. Communities found on sand, shingle and in transitional zones to terrestrial habitats are also briefly described and are of ecological importance. A summary of the rare and scarce plant species present within the harbour is provided.

Introduction

This chapter covers all intertidal vegetation within the harbour, up to and including those areas inundated at the highest spring tides. Sand and shingle habitats are also included as are transitions from saltmarsh to other terrestrial habitats. The major reedbeds were not surveyed as they were the subject of a specific study in 2000 (Cook, 2001), but the smaller stands not covered in that report are included. The chapter is a summary of fieldwork undertaken during the summers of 2001 and 2002 (Edwards, 2004).

For the purposes of this chapter, all plant names are in Latin only, and follow Stace (1991). Nomenclature for plant communities follows the National Vegetation Classification (NVC) (Rodwell,1995, 2000).

Vegetation

The vegetation of the harbour is strongly linked to the complex tidal regime, with a double high tide and a small tidal range of 1.8 m at spring tides and 60 cm at neaps (Hubbard and Stebbings, 1968). These factors coupled with the narrowness of the entrance produce a lagoon-like effect, with relatively poor flushing capabilities. During spring tides, substantial parts of saltmarsh are inundated for long periods. Another important factor in the formation of saltmarsh is the colonization and then rapid expansion of *Spartina anglica* (Raybould, 1997). Now the steady decline of *S. anglica* coupled with the predicted rise in sea levels will doubtless shape the saltmarshes of the future. Saltmarsh vegetation by its very nature is species-poor, typically being dominated by one or two highly specialized halophytic species. Generally, vegetation occurs in distinct zones linked to the tidal regime of a particular site (Tables 1 and 2).

The tidal range in Poole Harbour is very small, resulting in relatively poor zonation of the vegetation.

Summary of areas of habitats

Approximately 423 ha of saltmarsh (Table 3) are found at present within the harbour. The vast majority of this is lower saltmarsh dominated by *Spartina anglica* and is frequently inundated. Middle and upper vegetation is limited in extent and frequently found as linear stands just below mean high water.

These broad habitat categories have been split further into habitats listed in Annex I of the EU Habitats Directive (European Commission, 1996) (Table 4). The UK has a responsibility to protect these habitats.

Plant communities

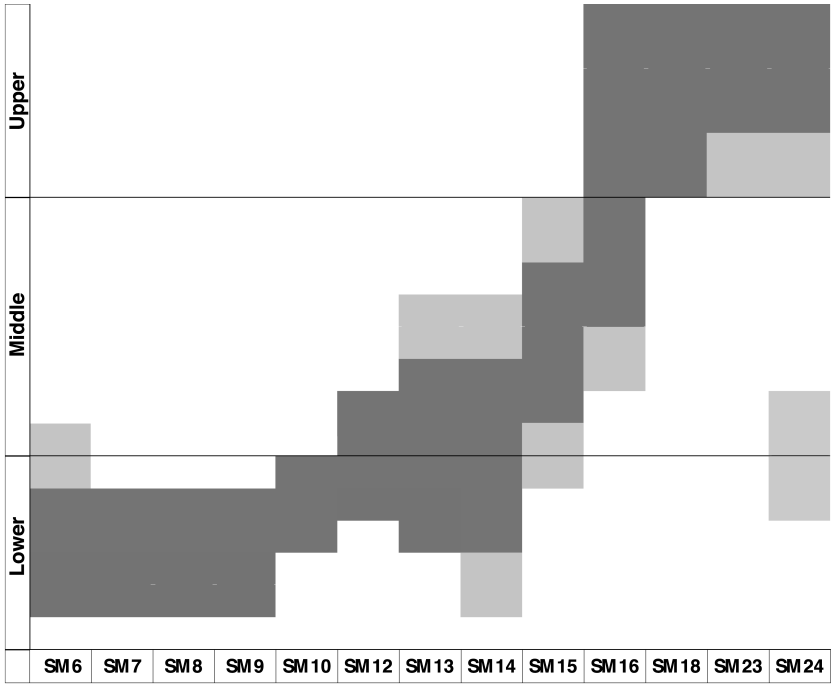
The present survey was not intended to be a full NVC survey of the harbour, but 152 quadrats were made throughout the harbour, using the standard NVC methodology, to sample the diversity of the plant communities within the site.

A total of 39 NVC communities, sub-communities and variants were identified, along with five vegetation types not described in the NVC (Table 5).

Table 1 Definition of saltmarsh zones

Lower saltmarsh This zone extends from low water mark through pioneer vegetation of *Salicornia* spp. and *Spartina anglica*, to closed, stable communities of *Aster tripolium*, *Limonium vulgare*, *Plantago maritima*, *Puccinellia maritima* and *Triglochin maritimum*.
Middle saltmarsh A difficult zone to distinguish in the harbour due to the small tidal range and subsequent compact nature of many of the marshes. Species absent from the lower zone such as *Festuca rubra*, *Juncus gerardii* and *J. maritimus* can dominate here but also extend into the upper zone.
Upper saltmarsh *Agrostis stolonifera*, *Elytrigia atherica*, *Festuca rubra*, *Juncus gerardii* or *J. maritimus* typically dominate this zone. Species tolerant of both freshwater and slightly saline conditions such as *Eleocharis uniglumis*, *Juncus subnodulosus*, *Potentilla anserina*, *Samolus valerandi* and *Triglochin palustris* occur.

Table 2 Approximate zonation of the saltmarsh communities within Poole Harbour



SM6 *Spartina anglica* saltmarsh
SM7 *Anthrocnemum perenne* stands
SM8 Annual *Salicornia* saltmarsh
SM9 *Suaeda maritima* saltmarsh
SM10 *Puccinellia maritima-Salicornia-Suaeda maritima* saltmarsh
SM12 *Aster tripolium* saltmarsh
SM13 *Puccinellia maritima* saltmarsh
SM14 *Halimione portulacoides* saltmarsh
SM15 *Juncus maritimus-Triglochin maritimum* saltmarsh
SM16 *Festuca rubra* saltmarsh
SM18 *Juncus maritimus* saltmarsh
SM23 *Spergularia marina-Puccinellia distans* saltmarsh
SM24 *Elymus pycnanthus* saltmarsh

Table 3 Summary of areas of different habitats

Saltmarsh total	423 ha
Lower saltmarsh	358 ha
Middle-upper saltmarsh	65 ha
Atlantic salt-meadows	175 ha
Mediterranean salt-meadows	33 ha
Salicornia and other annuals colonizing mud and sand	2.76 ha
Mediterranean and thermo-Atlantic halophilous scrub	0.51 ha
Shifting dunes along the shoreline with *Ammophila arenaria*	0.67 ha
Perennial vegetation of stony banks	0.20 ha
Annual vegetation of driftlines	0.16 ha

Table 4 Definition of Annex I habitats present in Poole Harbour

Salicornia and other annuals colonizing mud and sand
Salicornia spp. and *Suaeda maritima* on bare mud or sand substrates in the lower saltmarsh.

Atlantic salt-meadows
A wide habitat type encompassing NVC communities SM10 to SM20 inclusive. It includes all lower, middle and upper marsh vegetation dominated by one or more of *Agrostis stolonifera*, *Aster tripolium*, *Atriplex portulacoides*, *Eleocharis uniglumis*, *Festuca rubra*, *Juncus gerardii*, *Plantago maritima*, *Puccinellia maritima* and *Triglochin maritimum*.

Mediterranean salt-meadows
Juncus maritimus dominated NVC communities, SM15 and SM18, are included here.

Shifting dunes along the shoreline with *Ammophila arenaria*
Embryonic and mobile dunes dominated by *Ammophila arenaria* are included in this habitat, although *Leymus arenarius* dunes are excluded. SD6 is the corresponding NVC type.

Perennial vegetation of stony banks
Sparsely vegetated stabilized shingle within the NVC community. SD1 is included here.

Annual vegetation of driftlines
The SD2 *Honckenya peploides* strandline community, and vegetation with various *Atriplex* spp. and *Beta vulgaris*, which is not referable to any NVC community, are included in this category.

Mediterranean thermo-Atlantic halophilous scrub
Suaeda vera dominated vegetation with *Atriplex portulacoides* and *Elytrigia atherica*, and stands of *Sarcocornia perennis* are included here. SM25 and SM7 are the corresponding NVC communities.

Lower saltmarsh communities

Lower saltmarsh communities are not particularly diverse within the harbour as *Spartina anglica* dominates this zone. However, local pioneer communities are present as small stands on firm mud or sand substrates. Brownsea Lagoon has the largest stands of

Table 5 Summary of plant communities by habitat within Poole Harbour Special Protection Area (SPA)

Habitat	Number of plant communities
Saltmarsh	25
Sand-dune, shingle and driftline	9
Brackish swamps	7
Brackish grassland	2
Transitional vegetation	1
Total	**44**

pioneer *Salicornia* marsh (SM8) in which *S. ramosissima* and *S. europaea* dominate with the rarer, and nationally scarce, *S. fragilis* present locally. Smaller stands are found scattered along the southern shore. The nationally scarce *Sarcocornia perennis* is locally frequent among *Spartina*, but in the east of the harbour it locally forms dense stands (SM7) on firm sandy substrates. *Suaeda maritima* is generally rarer than the annual *Salicornia* spp., but in three areas it forms distinctive communities (SM9) on firm mud.

The *Spartina anglica* saltmarsh (SM6) is by far the most widespread of all the lower saltmarsh communities. *Spartina anglica* forms dense swards of between 20 cm and 80 cm in height. At the lowest level on soft mud, there are no other associates apart from marine algae. On firmer substrates, there are occasional scattered plants of *Atriplex portulacoides*, *Limonium vulgare*, *Salicornia* spp., *Sarcocornia perennis*, *Spergularia media* and *Suaeda maritima*. In places, a distinctive *Spartina anglica-Puccinellia maritima* saltmarsh (not described in the NVC) is well developed. *Spartina anglica* and *Puccinellia maritima* are co-dominant with few other species, except for *Atriplex portulacoides* and *Sarcocornia perennis*, attaining any abundance. These two communities occupy approximately 320 ha of the lower marsh resource in the harbour.

On firmer substrates, two species-rich, and colourful, communities are well developed. In the west of the harbour *Aster tripolium* is abundant (SM12a) with *Atriplex portulacoides*, *Plantago maritima* and *Puccinellia maritima* all prominent. In the south and east of the harbour, this community is replaced by the distinctive *Limonium vulgare* saltmarsh (SM13c). *Limonium vulgare* forms dense patches and is typically accompanied by *Armeria maritima*, *Atriplex portulacoides*, *Cochlearia anglica*, *Plantago maritima*, *Puccinellia maritima*, *Spergularia media* and *Triglochin maritimum*. In places, heavy grazing has reduced the abundance of herbs and *Puccinellia maritima* dominates (SM13a), with *Salicornia europaea* locally abundant. The increase of Sika Deer grazing is having more of an impact than the limited amount of cattle grazing and needs to be monitored.

A feature of the extensive *Spartina* marshes is the complex network of creeks. During high tides a small amount of sediment is deposited at the sides of the creeks eventually

raising them slightly. These creek levees often support different vegetation from the adjoining marsh. Particularly characteristic are linear stands of *Atriplex portulacoides* (SM14), which is typically the sole dominant, although scattered plants of *Puccinellia maritima*, *Spartina anglica* and *Sarcocornia perennis* may be present.

Middle saltmarsh communities

This zone is very difficult to distinguish in Poole Harbour due to the complex tidal regime. However, in places the *Juncus maritimus-Triglochin maritimum* saltmarsh (SM15) occupies this zone. *Juncus maritimus* is the overwhelming dominant forming dense clonal stands with *Atriplex portulacoides* and *Limonium vulgare* both locally abundant. *Juncus gerardii* and *Plantago maritima* are both prominent in some stands, but generally associated species are few. Stands of this community are often small and linear.

Upper saltmarsh communities

A total of 65 ha of upper saltmarsh is present in the harbour. Much of it is in narrow or linear stands at high water mark. There are two main communities, both of which are species-rich, compared with the lower saltmarsh communities, and of high ecological interest.

Most widespread is a short community dominated by *Festuca rubra* and *Juncus gerardii* (SM16). *Armeria maritima* and *Glaux maritima* are abundant locally (SM16c), with *Limonium vulgare*, *Plantago maritima*, *Puccinellia maritima*, *Spergularia media* and *Triglochin maritimum* also present. Where there is freshwater seepage into the back of the marsh, a different range of associates are present with *Agrostis stolonifera*, *Leontodon autumnalis* and *Potentilla anserina* particularly characteristic (SM16e).

The other major community is largely confined to the southern shore between Arne and Bramble Bush Bay. The *Juncus maritimus* saltmarsh (SM18b) is easily distinguished by the abundance of *J. maritimus* tussocks, between which *Agrostis stolonifera*, *Festuca rubra* and *Juncus gerardii* form a grassy sward. The scattered plants of *Oenanthe lachenalii* give the vegetation a distinctive appearance in late summer. An interesting variant is found on the Arne peninsula in a transition from saltmarsh to heathland where *Schoenus nigricans* is co-dominant with *Juncus maritimus*. This type of vegetation is not known elsewhere in southern England.

The only other community commonly encountered in this zone is the *Elymus atherica* saltmarsh (SM24). *Elymus atherica* forms dense stands up to 1 m high on firm substrates at the back of the saltmarsh or more rarely along creek levees. Often no other species attain any abundance, but there may be scattered plants of *Atriplex patula*, *A. prostrata*, *Rumex crispus* and *Sonchus arvensis*.

Sand-dune, shingle and driftline communities

Scattered throughout the harbour are small areas of shingle and sand. Where tourist pressure is not too great, a sparse covering of vegetation may develop. The communities present are often small in extent and support species that are otherwise rare in the harbour, and are under more threat than those found on the saltmarshes.

Small areas of vegetated shingle, often mixed with sand, occur at four places. They are sparsely vegetated, but support scattered plants of *Rumex crispus* and *Silene uniflora* (SD1), plus *Atriplex prostrata*, *Beta vulgaris* ssp. *maritima* and *Tripleurospermum maritimum*. More locally *Atriplex glabriuscula*, *A. littoralis*, *Elymus atherica*, *Senecio jacobaea*, *S. sylvaticus* and *S. viscosus* are also present.

At three sites, *Honckenya peploides* is locally abundant and forms a distinctive strandline community (SD2). Prostrate mats of *Honckenya peploides* dominate with no other species attaining any abundance. Associated species may include other uncommon strandline species including *Atriplex laciniata*, *A. littoralis* and *Cakile maritima*.

Sandy beaches and small dunes have a different flora. *Ammophila arenaria* and *Carex arenaria* are the most abundant species. Stands of the robust tussock-forming *Ammophila arenaria* (SD6) are characteristic of young mobile dunes in the east of the harbour. Associated species are few, apart from scattered plants of *Atriplex prostrata*, *Elytrigia atherica*, *Hypochaeris radicata*, *Leymus arenarius*, *Senecio jacobaea*, *S. sylvaticus* and *S. viscosus*. Locally the equally robust *Leymus arenarius* replaces *Ammophila arenaria* and forms a distinctive community (SD5), with few associates except for occasional plants of *Ammophila arenaria*, *Atriplex prostrata*, *Elytrigia atherica* and uncommonly, *E. juncea*.

Carex arenaria is widespread around the harbour wherever there are sandy substrates. However, only locally does it become dominant enough to form a distinct community (SD10). *Carex arenaria* is the sole dominant with no other species attaining any abundance. Associated species include species typical of dry acid grasslands such as *Aira praecox*, *Brachythecium albicans*, *Erodium cicutarium*, *Hypochaeris radicata*, *Jasione montana* and *Senecio jacobaea*.

At the junction of the sand, shingle and saltmarsh, a distinctive and important community is present in five sites. The nationally scarce woody shrub *Suaeda vera* dominates forming dense stands up to 1.5 m tall. Between the bushes, a low sward of *Atriplex portulacoides* and *Elytrigia atherica* is usually present. This type of Mediterranean-Atlantic scrub is a rare habitat within the UK.

Brackish swamp communities

Stands of tall graminoids are a feature of the western part of the harbour, often where there is some freshwater seepage. The most familiar are the brackish reedbeds which are

a prominent and important feature of the harbour. A recent survey of the larger reedbeds (Cook, 2001) found there to be 102.33 ha of reedbed split between 12 sites, with Holton Heath, Lytchett Bay and Slepe Moor supporting the largest areas. Botanically the reedbeds (S4) are species-poor, with dense *Phragmites australis* often dominating to the exclusion of all other species. Where there is freshwater seepage at the back of the reedbeds, poor-fen species such as *Galium palustre*, *Hydrocotyle vulgaris*, *Juncus subnodulosus*, *Lotus pedunculatus*, *Mentha aquatica* and *Oenanthe crocata* may be present. Grazed stands tend to be slightly richer with a grassy layer of *Agrostis stolonifera*, *Festuca rubra*, *Juncus gerardii* or *Spartina anglica* beneath the robust *Phragmites*.

Bolboschoenus maritimus is a common species around the harbour, typically at the back of saltmarshes, and extending locally to brackish ditches in grazing marsh. Stands of *Bolboschoenus maritimus* (S21) are common with *B. maritimus* the overwhelming dominant forming dense monotonous stands up to 2 m high. Typically there are few other species present apart from scattered plants of *Atriplex portulacoides*, *Schoenoplectus tabernaemontani* and *Spartina anglica*. More locally the glaucous *Schoenoplectus tabernaemontani* forms small stands (S20). Where there is freshwater flow into the back of the saltmarsh, species-rich vegetation develops with *Agrostis stolonifera*, *Eleocharis uniglumis*, *Festuca rubra*, *Juncus gerardii* and *Oenanthe lachenalii*, plus poor-fen species such as *Galium palustre*, *Hydrocotyle vulgaris* and *Lycopus europaeus*.

Transitional vegetation

One of the features of the southern shore of the harbour is the stands of transitional vegetation. Of particular interest are those from mire to saltmarsh, which are possibly unique to the area. During the survey three different types of transition were noted.

(i) Mire-saltmarsh

A rare transition, possibly unique to the harbour in southern England, largely confined to three sites along the southern shore, and which typically comprises dense stands of *Juncus subnodulosus*, sometimes with scattered plants of *Schoenus nigricans* and *Molinia caerulea*.

(ii) Freshwater seepage

Juncus subnodulosus is also abundant in this type, but is joined in some sites by *Eleocharis uniglumis*, *Isolepis cernua*, *Samolus valerandi*, *Schoenoplectus tabernaemontani* and *Triglochin palustre*.

(iii) Grassland-saltmarsh

This type is characterized by dense swards of *Agrostis stolonifera*, often with *Alopecurus geniculatus*, *Festuca rubra* and *Potentilla anserina*. Notable plants species include *Carex distans*, *Lotus glaber* and *Trifolium fragiferum*.

Transitional communities

Brackish grassland is largely confined to the grazing marsh in the lower floodplains of the Rivers Frome, Piddle and Sherford, but locally there are small stands in fields adjacent to the upper saltmarsh around the harbour. *Agrostis stolonifera* is the dominant grass species (MG11), with *Alopecurus geniculatus*, *Festuca rubra*, *Holcus lanatus* and *Lolium perenne* all locally prominent. *Carex distans*, *C. otrubae* and *Juncus gerardii* may be present in the richer stands. Herbs are generally restricted to frequent *Trifolium repens* and *Potentilla anserina*. Formerly the nationally scarce *Alopecurus bulbosus* was a feature of these grasslands, but a reduction in salinity with the construction of seawalls has reduced it to three small populations, its place being taken by the hybrid *A. plettkei*.

Locally within these grasslands small brackish pans develop where water stands at high spring tides. In these pans a distinctive community (SM23) is present and dominated by small prostrate plants of *Spergularia marina*. There is a wide range of associates including *Puccinellia maritima*, *Atriplex prostrata*, *Gnaphalium uliginosum*, *Juncus bufonius*, *J. gerardii*, *Plantago major* and *Polygonum aviculare.*

Very different vegetation develops on peaty soils where there is freshwater seepage into the back of saltmarshes. It is not sufficiently described within the NVC, although some stands clearly have affinities to the M22 *Juncus subnodulosus-Cirsium dissectum* fen-meadow, and could be referred to as the *Oenanthe lachenalii* sub-community (non-NVC). *Juncus subnodulosus* dominates, typically forming dense stands up to 1.5 m high. Beneath the *Juncus* there is often frequent *Agrostis stolonifera* and *Festuca rubra*, or more rarely *Eleocharis uniglumis*. *Juncus maritimus* is locally prominent. The herb component is poor and largely confined to scattered plants of *Oenanthe lachenalii* and *Galium palustre*, with occasional *Leontodon autumnalis*, *Lotus pedunculatus* and *Samolus valerandi*. In similar situations, stands of shorter vegetation dominated by *Eleocharis uniglumis* (SM20) are found in three areas along the southern shore of the harbour where there is freshwater seepage into the back of the marsh. *Eleocharis uniglumis* is accompanied by *Agrostis stolonifera*, *Festuca rubra* and *Juncus gerardii* giving a 'grass-dominated' appearance to the community.

Rare, scarce and notable species

Few rare or scarce plant species are found within the true saltmarsh habitats within the harbour. At present two Red Data Book (RDB) and ten Nationally Scarce (NS) species are recorded from the harbour (Table 6), but only four of these are strongly associated with saltmarsh habitats.

Along with the above nationally important species, there are a number of species that are rare or uncommon within the county or almost confined to the harbour (Table 7). Only four of these are found in the saltmarshes. Importantly, three species are found on strandlines in the east of the harbour and are under immediate threat from pressures of tourism.

Table 6 Rare and scarce plant species within Poole Harbour

Species	Status	Preferred habitat
Alopecurus bulbosus	NS	Brackish grazing marsh
Atriplex longipes	NS	Upper saltmarsh
Carex punctata	NS	Brackish grassland
*Cynodon dactylon**	RDB-Vu	Stabilized sand-dunes
Festuca arenaria	NS	Stabilized sand-dunes
Polypogon monspeliensis	NS	Brackish grazing marsh
Ruppia cirrhosa	NS	Brackish water
Salicornia fragilis	NS	Lower saltmarsh
Salicornia pusilla	NS	Lower saltmarsh
Sarcocornia perennis	NS	Lower saltmarsh
*Scirpoides holoschoenus**	RDB-Vu	Stabilized sand-dunes
Suaeda vera	NS	Strandlines

*Not considered native in Dorset.

Table 7 Species of local interest within Poole Harbour

Species	Preferred habitat
Ammophila arenaria[3]	Sand-dunes
Atriplex laciniata[1]	Sandy strandlines
Carex extensa[3]	Upper saltmarsh
Elytrigia juncea[3]	Sandy strandlines
Hypochaeris glabra[2]	Stabilized sand-dunes
Honckenya peploides[2]	Sandy strandlines
Leymus arenarius[3]	Stabilized sand-dunes
Limonium vulgare[3]	Mid and lower saltmarsh
Puccinellia distans[2]	Upper saltmarsh
Ruppia maritima[2]	Brackish water
Salicornia dolichostachya[2]	Lower saltmarsh

[1] Dorset Rare – fewer than three sites in the county.

[2] Uncommon in the county.

[3] Confined to, or very rare outside Poole Harbour.

Acknowledgements

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