S21
Scirpus maritimus swamp
Scirpetum maritimi (Br.-Bl. 1931) R.Tx. 1937

Synonymy
Scirpus maritimus zone Willis & Davies 1960; Stands dominated by *Scirpus maritimus* Gimingham 1964; *Scirpetum maritimi* Packham & Liddle 1970; Brackish water communities Birks 1973 *p.p.*; *Scirpus maritimus* nodum Adam 1976.

Constant species
Scirpus maritimus.

Rare species
Juncus subulatus.

Physiognomy
The *Scirpetum maritimi* is always dominated by *Scirpus maritimus* which usually forms a tall dense cover, about 60–80 cm high in which up to 10 shoots dm^{-2} have been recorded (Gimingham 1964*a*). No other species is frequent throughout. Pure stands are common and very rarely are there more than ten associates. Most often, there are scattered plants of a wide range of species characteristic of the upper salt-marsh and strandline: *Triglochin maritima*, *Juncus gerardi*, *Oenanthe lachenalii*, *Cochlearia anglica*, *Plantago maritima*, *Elymus pycnanthus* and *Apium graveolens* are those most commonly encountered. Even in the richer sub-communities, which are distinguished by the constancy of additional species, the associates rarely exceed a combined cover of 30% and most frequently form a patchy cover beneath the canopy of *S. maritimus*. *S. lacustris* ssp. *tabernaemontani* is rare here and never abundant.

Bryophytes are very sparse but there may be a prominent mat of algae over the substrate surface and around the bases of the *Scirpus* stools. Gimingham (1964*a*) noted the abundance of *Vaucheria* spp. in this algal mat in Scottish stands of the community.

The Mediterranean maritime rush, *Juncus subulatus*, has become naturalised within the *Scirpetum maritimi* on the young salt-marsh at Berrow in Somerset (Willis & Davies 1960). It successfully competes against *S. maritimus* there by healthy rhizome extension.

Sub-communities

Sub-community dominated by *Scirpus maritimus*. In the very species-poor vegetation of this sub-community, *S. maritimus* occurs alone or with one or two associates of salt-marsh communities and freshwater swamps. Surface algae, *Ruppia maritima* or tall swamp species such as *Phragmites australis* or *Glyceria maxima* occasionally attain local prominence.

***Atriplex prostrata* sub-community:** *Halo-Scirpetum maritimi* (van Langendonck 1931) Dahl & Hadač 1941. Here, *Atriplex prostrata* is constant and forms, with the less frequent *Puccinellia maritima*, rayed *Aster tripolium*, *Triglochin maritima* and a variety of upper-marsh species, an open ground cover.

***Agrostis stolonifera* sub-community.** *A. prostrata* remains constant in this sub-community but the most prominent feature of the vegetation is an open carpet of *Agrostis stolonifera*. Scattered through this, *Triglochin maritima*, *Glaux maritima*, *Juncus gerardi* and *Oenanthe lachenalii* occur and each may be abundant in particular stands. In this sub-community and the next there are also rare records for a variety of species common in inland freshwater and disturbed habitats, e.g. *Glyceria fluitans*, *Caltha palustris*, *Carex nigra*, *Viola palustris*, *Cirsium arvense* and *Stellaria media*.

***Potentilla anserina* sub-community.** The major species of the *Agrostis* sub-community retain their frequency here but, in addition, *Potentilla anserina* is constant, although it is rarely abundant. *Rumex crispus*, *Cochlearia officinalis*, *Festuca arundinacea* and *Juncus bufonius* also occur occasionally. This is the richest of the sub-communities and bryophytes may be locally conspi-

cuous with *Drepanocladus aduncus, Amblystegium serpens* and *Calliergon cuspidatum*.

Habitat

The community is characteristic of ill-drained brackish sites on coastal salt-marshes, occuring as often small patches in pans, borrow pits and alongside creeks, usually on the upper marsh, and in estuaries where stands may be more extensive. It has also been recorded from counter-dikes behind reclamation banks and from ditches and flashes in inland saline sites in Cheshire and Lancashire.

The *Scirpetum maritimi* seems to tolerate conditions which are both wetter and more saline than those typically favoured by the *Phragmites-Atriplex* swamp. The soils are characteristically unripened raw gleys of soft silt or clay, black and foul-smelling and sometimes with an orange crust. The water-table may fluctuate: salt-marsh stands are occasionally inundated by tidal waters, estuary stands frequently covered by brackish waters and the community can grow as emergent vegetation in more than 50 cm of standing water. However, a distinctive feature of the habitat seems to be the absence of a constant throughput of water, either brackish or fresh (e.g. Jermy & Crabbe 1978; cf. Chapman 1960*a*). In such situations, *S. maritimus* has been shown to tolerate salinities of up to about 20 g l^{-1} (chloridity 12 g l^{-1}: Willis & Davies 1960, Ranwell *et al.* 1964, Proctor 1980).

More exceptionally, the *Scirpetum maritimi* occurs on patches of rotting seaweed over shingle in western Scotland (Birks 1973) and the vegetation will also tolerate a certain amount of burial in blown sand. The community occurs on both grazed and ungrazed marshes. *Scirpus* shoots, roots and rhizomes are eaten by large-billed grey geese (Ogilvie 1978).

Zonation and succession

The *Scirpetum maritimi* can occur at various levels on coastal salt-marshes and, exceptionally, there may be a zonation within stands between the various sub-communities, from the *Scirpus*-dominated type at the lowest level, through the *Atriplex* and *Agrostis* sub-communities, to the *Potentilla* sub-community. More often, stands of one or other of the sub-communities, sometimes quite small in extent, occur within other salt-marsh communities, forming mosaics with the *Puccinellietum maritimae* or, more usually, the *Juncetum gerardi*, the *Juncetum maritimi* (Packham & Liddle 1970) or the *Festuca rubra-Agrostis stolonifera-Potentilla anserina* mesotrophic grassland. The boundaries of the *Scirpetum maritimi* are generally sharply marked by the dominance of *S. maritimus* but the vegetation types may grade one into another through the associates in the subsidiary layer of the swamp.

In estuaries, the *Scirpetum maritimi* is sometimes the pioneer vegetation in an inverted zonation, as on the Exe for example, where it occurs down-slope from the *Spartinetum townsendii* and the *Juncetum gerardi* (Proctor 1980).

The community also grades to other swamp types in salt-marsh depressions or on estuarine foreshores. It frequently passes gradually into the *Scirpetum tabernaemontani* with a switch in dominance between the two *Scirpus* taxa and mosaics with the *Phragmitetum australis* are common. On the Nith in the Solway Firth and at Dingwall in the Cromarty Firth, the *Scirpetum maritimi* occurs seaward of the *Atriplex* sub-community of this swamp type.

In a number of sheltered sea-lochs in western Scotland, the community occurs as a fringe of emergent vegetation giving way sharply above to *Alnus* woodland, a zonation which is widespread in the Baltic (Tyler 1969*b*).

Distribution

The *Scirpetum maritimi* occurs in suitable sites on all coasts of the British Isles as far north as Sutherland. The *Scirpus*-dominated and *Atriplex* sub-communities have been recorded throughout the range; the *Agrostis* and *Potentilla* sub-communities seem to be more common on the grazed sandy marshes of the west coast.

Affinities

Although the community is readily recognisable, the species-poor nature of much of the vegetation makes it difficult to define its affinities and phytosociological treatments have been confused. Some authorities regard this vegetation as a form of *Scirpo-Phragmitetum*; others give it association status still within the Phragmition alliance. Yet others place a *Scirpetum maritimi* within a completely separate class, the Bulboschoenetea, so as to give prominent recognition to the scarcity of Phragmition and Magnocaricion associates (e.g. Birse 1980).

On occasion, a distinction has been made within vegetation of this kind between very species-poor stands and those which have prominent halophyte associates. The former, in which the dominant taxon is *S. maritimus* var. *maritimus*, have been retained as a *Scirpetum maritimi*; the latter, distinguished by the dominance of *S. maritimus* var. *compactus*, have been separated off into a *Halo-Scirpetum* and placed in a Halo-Scirpion alliance within the Asteretea (e.g. Westhoff & den Held 1969). Although this view has been widely adopted in Holland, these two *Scirpus* taxa have not generally been distinguished in Britain and are not separated in the most recent European treatment of the genus (DeFilipps 1980). Although the vegetation described here as the *Atriplex* sub-community clearly corresponds to the *Halo-Scirpetum*, it is no more distinctive than the other

two richer sub-communities and it seems preferable to retain all within a single vegetation type.

Since its original description by Willis & Davies (1960), *Juncus subulatus* has considerably expanded its cover at Berrow and is less obviously part of the *Scirpetum maritimi* in which it originally gained a hold. Within its chief area of distribution, around the Mediterranean, the Caspian and the north Spanish coast, this species occurs in the perennial glasswort vegetation of the *Salicornietum fruticosae* (Braun-Blanquet 1952), with *Juncus maritimus* (Molinier 1948, Gradstein & Smittenburg 1977) and with *Scirpus maritimus* (Holmboe 1914, Bolos & Bolos 1950). Willis & Davies (1960) noted the interesting parallels between the British occurrence of *J. subulatus* and two other rarities with a foothold in the south-west maritime zone, *Scirpus holoscheonus* and *Juncus mutabilis*.

Floristic table S21

	a	b	c	d	21
Scirpus maritimus	V (6–10)	V (6–10)	V (5–10)	V (7–10)	V (5–10)
Atriplex prostrata		V (1–6)	IV (1–6)	III (2–4)	III (1–6)
Puccinellia maritima	I (2–6)	II (1–7)	I (2–6)	I (3)	I (1–7)
Aster tripolium (rayed)	I (2–5)	II (2–6)	I (2–5)		I (2–6)
Aster tripolium var. *discoideus*		I (2)			I (2)
Agrostis stolonifera			V (3–7)	V (3–6)	II (3–7)
Triglochin maritima	I (3–6)	II (2–4)	III (2–5)	III (2–5)	II (2–6)
Glaux maritima	I (1–4)		II (2–5)	II (4)	I (1–5)
Juncus gerardi	I (2–3)	I (2–3)	II (2–6)	III (2–6)	I (2–6)
Oenanthe lachenalii	I (2–4)	I (2)	II (1–6)	I (3–4)	I (1–6)
Juncus maritimus			I (3–7)		I (3–7)
Puccinellia distans			I (5–8)		I (5–8)
Samolus valerandi			I (1)		I (1)
Potentilla anserina				V (2–7)	I (2–7)
Rumex crispus	I (1–3)	I (1–3)	I (1–6)	II (2–4)	I (1–6)
Cochlearia officinalis		I (2)	I (1–4)	II (1–2)	I (1–4)
Festuca arundinacea	I (3)		I (2–4)	II (2–3)	I (2–4)
Drepanocladus aduncus			I (3)	II (1–4)	I (1–4)
Juncus bufonius			I (4)	II (2)	I (2–4)
Juncus articulatus				I (1–3)	I (1–3)
Amblystegium serpens				I (4)	I (4)
Elymus pycnanthus	I (2–6)	I (3–7)	I (4)	I (3)	I (2–7)
Cochlearia anglica	I (1–4)	I (2–3)	I (2–5)	I (1)	I (1–5)
Apium graveolens	I (3–4)	I (2)	I (3–5)	I (5)	I (2–5)
Carex otrubae	I (3)	I (3)	I (3–4)	I (1)	I (1–4)
Plantago maritima	I (2–3)	I (2–3)	I (3)	I (3)	I (2–3)
Scirpus lacustris tabernaemontani	I (2)	I (2)	I (3–6)	I (3)	I (2–6)
Calystegia sepium	I (2)	I (3)	I (3–4)	I (3)	I (2–4)

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Algal mat	II (4–8)	I (6–8)
Spartina anglica	I (2–3)	I (1–3)
Suaeda maritima	I (3–6)	I (3–6)
Aster tripolium	I (2–3)	I (1)
Halimione portulacoides	I (3–4)	I (3)
Spergularia marina	I (1)	I (2–7)
Sonchus arvensis	I (2)	I (1–4)
Berula erecta	I (3–4)	
Phragmites australis	I (2–5)	
Mentha aquatica	I (3)	
Limonium cf. *vulgare*	I (2)	
Salicornia dolichostachya	I (2–3)	
Epilobium parviflorum	I (3)	
Glyceria maxima	I (5)	
Ruppia maritima	I (8)	
Spergularia media	I (3)	
Iris pseudacorus	I (1–2)	
Galium palustre	I (4)	
Hydrocotyle vulgaris	I (3)	
Ranunculus sceleratus		I (1)
Tripleurospermum maritimum		I (2–3)
Matricaria maritima		I (2–3)
Elymus repens		I (3)
Galium aparine		I (2)
Oenanthe crocata		I (2)
Rumex conglomeratus		I (3)
Eleocharis palustris		
Eleocharis uniglumis		
Caltha palustris		
Festuca rubra		
Glyceria fluitans		
Carex nigra		
Cirsium arvense		
Stellaria media		
Viola palustris		

II (4–8)		I (4–8)
I (2)		I (1–3)
I (3)		I (3–6)
I (1–3)		I (1–3)
I (2)		I (2–4)
I (3–4)		I (1–7)
I (3)		I (1–4)
I (3–5)		I (3–5)
I (3–4)		I (2–5)
I (3–6)		I (3–6)
I (1)		I (1–2)
I (3)		I (2–3)
I (2)		I (2–3)
I (4)		I (4–5)
I (5)		I (5–8)
I (2)		I (2–3)
I (2–3)	I (1)	I (1–3)
I (2–4)	I (1)	I (1–4)
I (2–9)	I (4)	I (2–9)
I (2–3)	I (2)	I (1–3)
I (2)	I (2)	I (2–3)
I (2)	I (2)	I (2–3)
I (2–6)	I (3)	I (2–6)
I (1–2)		I (1–2)
I (2–5)		I (2–5)
I (2)		I (2–3)
I (3–5)	I (1–2)	I (1–5)
I (4–6)	I (4)	I (4–6)
I (4)	I (2–3)	I (2–4)
I (4)	I (4)	I (4)
I (2)	I (3–4)	I (2–4)
I (5)	I (3)	I (3–5)
I (3)	I (2)	I (2–3)
I (4)	I (4)	I (4)
I (2)	I (2)	I (2)

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Floristic table S21 (*cont.*)

	a	b
Calliergon cuspidatum		
Ranunculus flammula		
Number of samples	54	28
Number of species/sample	3 (1–12)	4 (2–9)
Vegetation height (cm)	81 (37–150)	78 (40–120)
Vegetation cover (%)	87 (40–100)	95 (80–100)

a *Scirpus maritimus*-dominated sub-community
b *Atriplex prostrata* sub-community
c *Agrostis stolonifera* sub-community
d *Potentilla anserina* sub-community
21 *Scirpetum maritimi* (total)

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c	d	21
I (5)	I (2)	I (2–5)
I (3)	I (3)	I (3)
37	12	131
7 (3–13)	10 (6–20)	5 (1–20)
69 (25–130)	73 (35–120)	76 (25–150)
93 (60–100)	91 (75–100)	91 (40–100)

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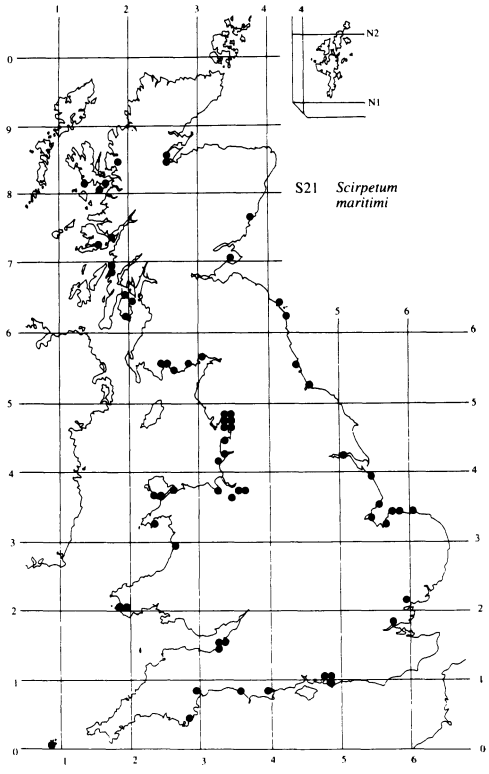

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