S8
Scirpus lacustris ssp. *lacustris* swamp
Scirpetum lacustris (Allorge 1922) Chouard 1924

Synonymy
Scirpus lacustris open reed-swamp *auct. angl.*; *Scirpo-Phragmitetum* Koch 1926 *p.p.*. (not *sensu* Wheeler 1980*a*); *Scirpeto-Phragmitetum medioeuropaeum* (Koch 1926) R.Tx. 1941 *p.p.*

Constant species
Scirpus lacustris ssp. *lacustris*.

Physiognomy
The *Scirpetum lacustris* typically has a somewhat open cover of *S. lacustris* ssp. *lacustris*, the stout emergent flowering shoots of which may reach more than 2 m above water-level. The robust creeping rhizomes frequently produce tufts of totally submerged leaves. No other species is frequent throughout but the sub-communities are distinguished by preferentially frequent species which may attain local abundance. It should be noted that, in the data available, submerged and floating-leaved aquatics are largely confined to the *Equisetum fluviatile* sub-community. This is probably, at least in part, a reflection of the fact that in many lowland waters, the sometimes rich aquatic flora which often overlapped in distribution with the *Scirpetum lacustris* has been lost because of pollution and disturbance.

Sub-communities

***Scirpus lacustris* ssp. *lacustris* sub-community:** *Scirpus lacustris* open reed-swamp Pallis 1911; *Scirpetum lacustris*, *Scirpus-Nymphaea mictium* and *Phragmites-Scirpus* associes *p.p.*. Tansley 1939; *Schoenoplectus lacustris* society Wheeler 1978; Association of *Phragmites australis* and *Schoenoplectus lacustris* Pigott & Wilson 1978. Here are included pure stands of *S. lacustris* ssp. *lacustris* and mixed stands with *P. australis* where the former species remains the more abundant. No other species is frequent or abundant, although it is clear that, in the past, such swamps were sometimes associated with a rich aquatic flora including *Nuphar lutea*, *Nymphaea alba*, *Lemna minor*, *L. gibba*, *Wolfia arrhiza*, *Spirodela polyrhiza*, *Potamogeton natans*, *P. lucens*, *P. perfoliatus* and *P. crispus* (e.g. Pallis 1911, Tansley 1939).

***Sparganium erectum* sub-community:** *Scirpus lacustris* riparian reedswamp Butcher 1933. In this sub-community, there is a generally lower emergent canopy of *S. lacustris* ssp. *lacustris* intermixed with *Sparganium erectum* and, sometimes, *Alisma plantago-aquatica*.

***Equisetum fluviatile* sub-community:** *Schoenoplectus lacustris-Juncus fluitans* sociation Spence 1964; *Schoenoplectus lacustris-Phragmites communis* Association, *Schoenoplectus lacustris-Equisetum fluviatile* subassociation Birks 1973. Here, there is again a generally shorter canopy of *S. lacustris* ssp. *lacustris* but, in this sub-community, the shoots are intermixed with emergent *Equisetum fluviatile*, *Carex rostrata* and *Menyanthes trifoliata*, each of which may be locally prominent. Less frequent are *Potentilla palustris*, *Galium palustre* and *Ranunculus flammula* and, with floating leaves, *Potamogeton natans* and *Nymphaea alba*. *Juncus bulbosus* (including *J. fluitans* Lam.) occasionally forms submerged tangles and, in some Scottish lochs, *Sparganium minimum* has been reported as a distinctive associate (Spence 1964). A wide variety of other aquatic and fen species occur rarely.

Habitat
The *Scirpetum lacustris* is, above all, a swamp of deep water occurring typically in larger pools and lakes, in high-order streams and, more rarely, in canals and dykes. It is predominantly a lowland vegetation type.

The community has been recorded from water depths up to 150 cm and it does not seem to occur where there is less than 25 cm of water. Its smooth and elastic stems may offer less resistance than other swamp emergents to the wave turbulence and high winds that can develop over extensive stretches of deeper, open water (Tansley

1939). It is most characteristic of standing or slow-moving waters although it can resist fast flows, provided there is not much spate which tends to snap off the emergent shoots (Haslam 1978). In faster rivers, the proportion of submerged leaves increases, though these too can be damaged by much turbulence (Butcher 1933, Haslam 1978).

S. lacustris ssp. *lacustris* has both superficial creeping rhizomes which form a robust network and a mass of more deeply penetrating roots and it has been suggested (Haslam 1978) that this might account for its ability to colonise a variety of substrates from fine but root-resistant stable gravels to soft deep silts. Pearsall (1921) considered that, in the Lake District, the *Scirpetum* was typical of more organic substrates than those occupied by the *P. australis* swamps.

The floristic differences between the sub-communities seem to be related to water depth and the trophic state of the habitat. The *Sparganium* sub-community is typically encountered in shallower, more eutrophic waters in slow-flowing clay streams and silted dykes where there may be additional enrichment by run-off from surrounding farmland. The *Equisetum* sub-community, on the other hand, is characteristic of deeper and more nutrient- and base-poor waters typical of lakes over hard arenaceous rocks towards the upland fringes. The *Scirpus* sub-community occurs in a variety of situations where the waters are of intermediate quality, although it also includes very species-poor stands in deeper waters in both oligotrophic and eutrophic sites.

Zonation and succession

The *Scirpetum lacustris* represents the deep-water limit of swamp vegetation in Britain and stands may be isolated beyond the more proximal parts of emergent sequences. In larger lakes, where the community is represented by the *Scirpus* or, in shallower water, the *Equisetum* sub-community, extensive stretches of open water may occur between the community and inshore swamps. In Scottish lakes, Spence (1964) commonly encountered mixtures of submerged *Juncus bulbosus* (i.e. *J. fluitans* Lam.) and *Littorella uniflora* in this intervening zone and often running out to form, with *Sparganium minimum*, a distinctive understorey to the *Scirpetum*. In other cases, the community gave way, in shallower water, to *Phragmitetum australis*, sometimes with a narrow zone of overlap between the two vegetation types. An essentially similar zonation occurs at Esthwaite in Cumbria (Pearsall 1918, Tansley 1939, Pigott & Wilson 1978).

It is clear that, at North Fen at Esthwaite, the *Scirpetum* advanced some 15–30 m into open water between 1915 and 1929 (Pearsall 1918, Tansley 1939) and, along part of its front, about half this distance between 1929 and 1967 (Pigott & Wilson 1978), giving rates of movement between about 0.5 and 2 m yr^{-1}. At other sites, however, stands have remained more or less unaltered and stationary for at least 50 years (West 1905, Spence 1964: cf. Plates 70 & 71 in Spence 1964) and *S. lacustris* ssp. *lacustris* may itself be of little importance in terrestrialisation.

In rivers and streams, small and fragmentary stands of the *Scirpus* sub-community may stand some distance out from the banks in deeper water. On more steeply shelving profiles, the *Sparganium* sub-community may form part of a narrow transition from open water, through the *Sparganietum erecti* to the *Glycerietum maximae* or some form of tall-herb vegetation (Haslam 1978).

Distribution

S. lacustris ssp. *lacustris* is predominantly a lowland species, being commonest in the Midlands and southern England but, in this region, the *Scirpetum* generally occurs as small stands of the *Scirpus* or *Sparganium* sub-communities. Larger stands of the *Scirpus* or *Equisetum* sub-communities are more characteristic of the northern and west lowlands where *S. lacustris* ssp. *lacustris* is more locally distributed but where larger bodies of open water are more frequent. The *Scirpetum* is notably uncommon in Broadland (Lambert 1946, 1951; Wheeler 1978).

Affinities

Unlike many other emergents, *S. lacustris* ssp. *lacustris* occurs but sparsely in communities other than the swamp vegetation in which it is the dominant and most of the difficulties of classification arise because of its partial overlap in shallower waters with *P. australis*. In some schemes, vegetation with either or both of these species dominant has been placed in a single large swamp type such as the *Scirpeto-Phragitetum* (Koch 1926, Tüxen 1941).

Floristic table S8

	a	b	c	8
Scirpus lacustris lacustris	V (5–10)	V (5–10)	V (8–9)	V (5–10)
Phragmites australis	II (1–3)			I (1–3)
Lythrum salicaria	I (3)			I (3)
Sparganium erectum		V (3–8)		II (3–8)
Alisma plantago-aquatica		II (4–6)		I (4–6)
Lemna minor		I (3)		I (3)
Hydrocharis morsus-ranae		I (2)		I (2)
Ceratophyllum demersum		I (6)		I (6)
Elodea canadensis		I (6)		I (6)
Lemna gibba		I (9)		I (9)
Sagittaria sagittifolia		I (6)		I (6)
Juncus conglomeratus		I (4)		I (4)
Lycopus europaeus		I (3)		I (3)
Spirodela polyrhiza		I (9)		I (9)
Polygonum bistorta		I (3)		I (3)
Solanum nigrum		I (4)		I (4)
Typha latifolia		I (5)		I (5)
Equisetum fluviatile			V (2–6)	II (2–6)
Carex rostrata			IV (3–4)	II (3–4)
Menyanthes trifoliata			III (3–4)	II (3–4)
Potamogeton natans			III (2–4)	II (2–4)
Nymphaea alba		I (1)	II (1–3)	I (1–3)
Juncus bulbosus			II (2–4)	I (2–4)
Ranunculus flammula			II (1–2)	I (1–2)
Potentilla palustris			II (3)	I (3)
Galium palustre			II (2–3)	I (2–3)
Juncus acutiflorus			I (2)	I (2)
Utricularia minor			I (1)	I (1)
Potamogeton lucens			I (1)	I (1)
Potamogeton polygonifolius			I (4)	I (4)
Myriophyllum alterniflorum			I (2)	I (2)
Potamogeton perfoliatus			I (1)	I (1)
Sparganium angustifolium			I (1)	I (1)
Carex curta			I (4)	I (4)
Caltha palustris			I (1)	I (1)
Angelica sylvestris			I (1)	I (1)
Epilobium palustre			I (2)	I (2)
Hydrocotyle vulgaris			I (2)	I (2)
Agrostis canina canina			I (2)	I (2)
Carex nigra			I (1)	I (1)
Filipendula ulmaria			I (4)	I (4)
Juncus effusus			I (2)	I (2)
Mentha aquatica			I (4)	I (4)
Polygonum amphibium			I (2)	I (2)
Stachys palustris			I (4)	I (4)

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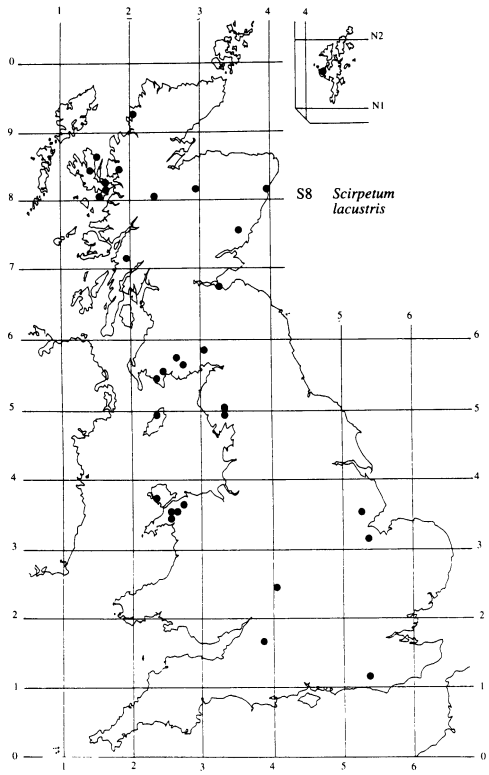
	a	b	c	8
Solanum dulcamara	I (2)	I (3)		I (2–3)
Glyceria fluitans	I (2)		I (1)	I (1–2)
Eleocharis palustris	I (3)		I (4)	I (3–4)
Iris pseudacorus		I (1)	I (5)	I (1–5)
Nuphar lutea		I (4)	I (5)	I (4–5)
Number of samples	5	5	8	18
Number of species/sample	2 (1–3)	6 (2–8)	8 (4–13)	5 (1–13)
Vegetation height (cm)	180 (150–210)	130 (60–230)	112 (100–124)	135 (60–230)
Vegetation cover (%)	60 (20–100)	99 (95–100)	84 (40–100)	81 (20–100)

a *Scirpus lacustris lacustris* sub-community
b *Sparganium erectum* sub-community
c *Equisetum fluviatile* sub-community
8 *Scirpetum lacustris* (total)



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