S25
Phragmites australis-Eupatorium cannabinum tall-herb fen

Synonymy
Fen Formation Tansley 1911 *p.p.*; *Scirpo-Phragmitetum* Koch 1926 *p.p.*; Valley fen communities Bellamy & Rose 1961 *p.p.*; *Phragmites* valley fen Haslam 1965; *Angelico-Phragmitetum australis* Wheeler 1980*a*, not *sensu* Ratcliffe & Hattey 1982.

Constant species
Eupatorium cannabinum, *Galium palustre*, *Phragmites australis*.

Rare species
Thelypteris palustris.

Physiognomy
The most consistent feature of the rather variable vegetation included in this community is the prominence of tall herbaceous dicotyledons among which *Eupatorium cannabinum*, *Angelica sylvestris*, *Lythrum salicaria*, *Cirsium palustre*, *Valeriana officinalis*, *Iris pseudacorus*, *Filipendula ulmaria* and *Epilobium hirsutum* are the most frequent throughout. Those other tall herbs so characteristic of the *Peucedano-Phragmitetum*, *Peucedanum palustre* and *Lysimachia vulgaris*, are rare and the patchy dominance of more nutrient-demanding species typical of the *Phragmites-Urtica* fen is uncommon. Here, a variety of monocotyledons may be dominant. *Phragmites australis* is constant throughout and is often the most abundant species, but, in some stands, *Carex paniculata* or *Cladium mariscus* dominate and, more rarely, *Carex elata*, *C. riparia* or *C. acuta* may attain prominence.

Beneath, there is often some *Juncus subnodulosus*, although the amount of this is very variable, and a variety of small herbs, among which *Mentha aquatica* and *Caltha palustris* are the most frequent. *Galium palustre* is a constant sprawler with, less commonly, *Vicia cracca*, *Solanum dulcamara* and *Calystegia sepium*. Bryophytes are rarely abundant but there is occasionally a little *Calliergon cuspidatum* and *Brachythecium rutabulum*. In some sub-communities, saplings of *Salix cinerea* or *Myrica gale* bushes are conspicuous.

Sub-communities

***Phragmites australis* sub-community:** *Angelico-Phragmitetum typicum* and *juncetosum subnodulosi* Wheeler 1980*a*. Here, *Phragmites* is usually the dominant, forming a canopy 1–2 m tall, although *E. cannabinum* and *E. hirsutum* can both be locally abundant. Denser stands of reed are rather species-poor but where the cover is more open there are small amounts of the tall and short herbaceous dicotyledons of the community and frequently a little *J. subnodulosus*. Here, too, *Lychnis flos-cuculi*, *Equisetum fluviatile* and *E. palustre* occurs occasionally and sprawlers are sometimes conspicuous with *Vicia cracca*, *Calystegia sepium*, *Galium uliginosum* and *Lotus uliginosus*. *Calliergon cuspidatum* and *Brachythecium rutabulum* may be prominent over litter and damp patches of bare substrate.

***Carex paniculata* sub-community:** *Caricetum paniculatae* Wangerin 1916 *p.p.*; *Angelico-Phragmitetum caricetosum paniculatae* Wheeler 1980*a*. The general floristics of this sub-community are very similar to the above but, although *Phragmites* remains constant, it is usually present in smaller amounts and the vegetation is dominated by the bulky tussocks of *C. paniculata*, sometimes over 1.5 m tall. *Carex acuta*, *Scrophularia aquatica* and *Phalaris arundinacea* are slightly preferential here and there are very frequently some saplings of *Salix cinerea* on the tussock tops.

***Cladium mariscus* sub-community:** *Cladietum marisci* (Allorge 1922) Zöbrist 1935 *p.p.*; *Cladium-Phragmites* consociation Wheeler 1975 *p.p.* Some of the taller herbaceous dicotyledons, notably *Cirsium palustre*, *Epilobium hirsutum*, *Angelica sylvestris* and *Valeriana officinalis*, are rare or absent here and the vegetation is usually strongly dominated by mixtures of *Cladium* and *Phrag-*

mites, sometimes with *Carex elata*. *J. subnodulosus* is constant and sometimes abundant and there is occasionally a little *Scutellaria galericulata* and *Myrica gale*. A variety of species typical of the *Peucedano-Phragmitetum* occur at low frequency, e.g. *Thelypteris palustris*, *Berula erecta*, *Oenanthe lachenalii* and *Pedicularis palustris*. Again, *Salix cinerea* saplings are frequent.

Habitat

The *Phragmites-Eupatorium* fen is most characteristic of moderately eutrophic situations where mineral or organic soils are irrigated and frequently waterlogged by usually calcareous and base-rich waters. It is typically a community of valley mires developed alongside small lowland rivers with catchments of calcareous bedrocks or superficial deposits but it also occurs in some extensive flood-plain mires and open-water transitions. It can be found, too, in spring and basin mires where more oligotrophic fen peats have been subject to moderate disturbance. Although some stands are found in sites with a history of fen treatment, the community is not maintained by mowing and is generally ungrazed.

The particular habitat feature associated with this kind of fen seems to be the moderate level of nutrient enrichment. In the most usual situation in valley mires, nutrient levels are renewed by the constant throughput of water and the occasional flooding of the alluvial terraces with the deposition of allochthonous sediments. The *Phragmites* and *Carex paniculata* sub-communities are especially characteristic of the periodically waterlogged silty fen peats or humose alluvial soils which occur on such terraces. In Breckland, where both sub-communities, and especially the former, have been described from the valley mires along the middle reaches of the Wissey, Little Ouse, Thet and Lark, Haslam (1965) noted that it was the larger amounts of available phosphate in the more substantial inorganic fraction that most clearly distinguished the soils under these vegetation types from those carrying the *Schoeno-Juncetum subnodulosi* in the headwater spring mires. Where the *Phragmites-Eupatorium* fen occurred in the latter type of mire, as the *Phragmites* or *Cladium* sub-communities, it was confined to areas where there had been some amelioration of the naturally more oligotrophic conditions: where the peat had become drier on the surface and oxidised, alongside the silt-carrying main streams, around more nutrient-rich springs, along ditches or over areas which had been dug for peat long before (see also Bellamy & Rose 1961). Similar features may mark the community's occasional occurrences in basin mires.

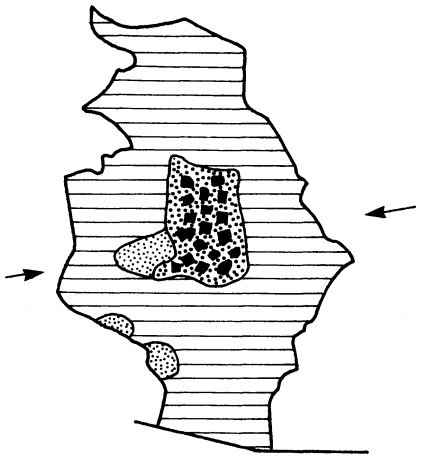
Zonation and succession

The *Phragmites-Eupatorium* fen occurs typically in small, often linear, stands in complexes of herbaceous and woody vegetation on mires which are now often sharply marked off from surrounding agricultural land. In more intact valley mires, the *Phragmites* and *Carex paniculata* sub-communities may form a zone along the river terraces, sometimes grading in open water to *Phragmitetum australis* swamp. On drier ground there may be a transition to the *Salix cinerea-Betula pubescens-Phragmites australis* woodland or *Alnus glutinosa-Carex paniculata* woodland. This probably represents a fairly natural succession on alluvial deposits in these calcareous and fairly eutrophic valley mires and Haslam (1965) adduced some documentary evidence that *S. cinerea* carr had succeeded *Phragmites*-dominated vegetation in 50 years in a Breckland site. Frequently, however, such successions have been disturbed and zonations are more complex (Figure 16). Peat digging and mowing for litter are known to have occurred in some valley mires and the abandonment of these practices, together with subsequent interference such as periodic burning, channel dredging, the construction of embankments and the drainage of surrounding land, is often marked now by a patchwork of the *Phragmites-Eupatorium* fen with more eutrophic communities such as the tall-herb vegetation of the *Phragmites-Urtica* fen and the *Epilobietum hirsutae* (e.g. Haslam 1965, Ratcliffe & Hattey 1982) and the *Alnus glutinosa-Urtica dioica* woodland over the dry and disturbed alluvium.

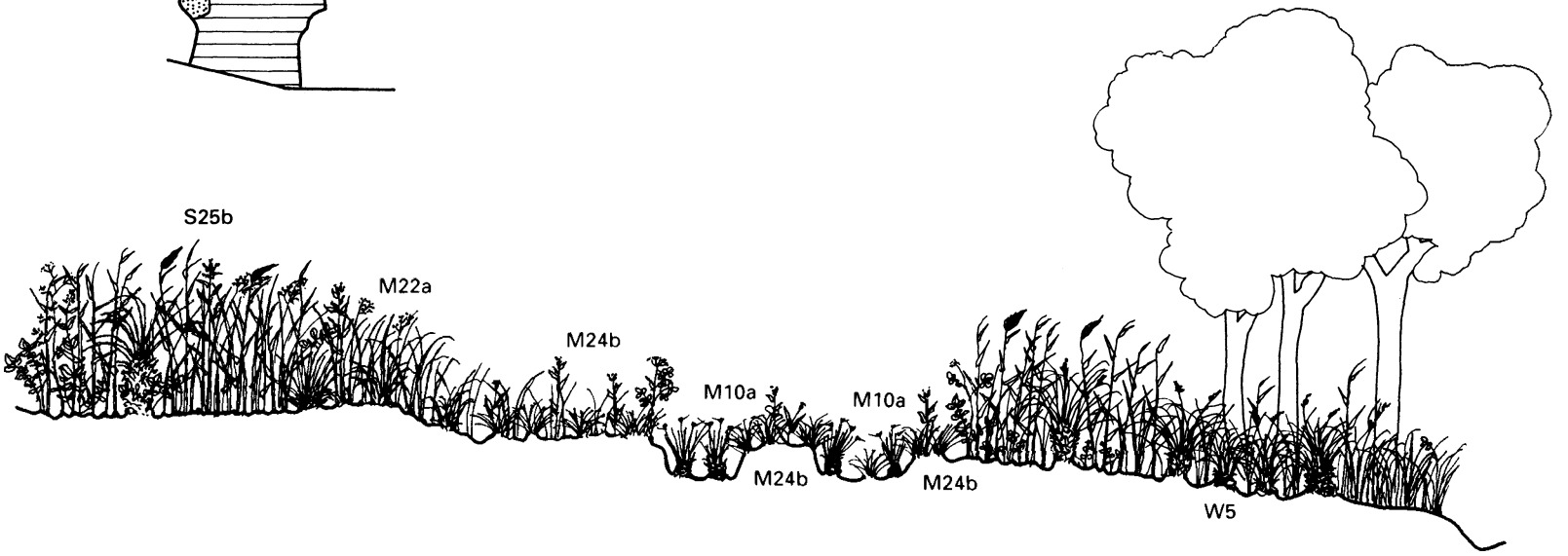
In some valley mires, there is a natural marginal transition from the community to the *Schoeno-Juncetum* along a spring-line (Haslam 1965, Wheeler 1980*c*). Often, though, the accessible edges of valley mires have been open to stock and grazing has obscured any zonations. In such situations, well described from the East Kent fens (Rose 1950) and the Gordano Valley in Somerset (Willis & Jefferies 1959), the *Phragmites-Eupatorium* fen may survive only around the wetter streams and dykes in a landscape of fen-meadow. Similar patterns can be seen on some disturbed spring mires, such as those described from the Little Ouse–Waveney watershed on the Norfolk–Suffolk border (Bellamy & Rose 1961, Haslam 1965).

In more eutrophic calcareous topogenous mires, the community can occur as a zone between swamps and woodland, although here, too, patterns may be confused by disturbance and truncated above by sharp transitions to agricultural land. Some open-water transitions and flood-plain mires have a belt of the *Phragmites* or *Carex paniculata* sub-communities between the *Phragmitetum* or *Caricetum paniculatae* and *Alnus* woodland, as in certain of the Shropshire Meres (Sinker 1962, Meres Report 1980). In smaller basin mires, such as some of those in Anglesey, the *Cladium* sub-community can occur as a zone grading in open water to the *Cladietum marisci* or the *Caricetum elatae* or in a mosaic with the *Schoeno-Juncetum* and fen-meadow vegetation.

Figure 16. Map and cross-section showing pattern of fen, fen-meadow and woodland vegetation at Market Weston Fen, Suffolk (by kind permission of Suffolk Wildlife Trust).



S25b *Phragmites-Eupatorium* fen, *Carex paniculata* sub-community on intact fen peat
M22a *Juncus subnodulosus-Cirsium palustre* fen-meadow, Typical sub-community on peat with some ground-water seepage, mown annually
M24b *Cirsio-Molinietum* fen-meadow, *Eupatorium* sub-community on raised areas among old peat-cuttings
M10a *Schoeno-Juncetum* fen, *Caltha-Galium* sub-community in old peat-cuttings with ground-water seepage
W5 *Alnus-Carex paniculata* woodland on peaty alluvium with flooding from river



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Distribution

The community has a widespread but scattered distribution throughout the English and Welsh lowlands and, outside Broadland, it represents the richest kind of fen vegetation. The community has not been recorded from Scotland, although some of the samples in Spence's (1964) *Carex paniculata-Angelica* sociation could perhaps be accommodated within the *Carex paniculata* sub-community.

The *Phragmites-Eupatorium* fen is especially characteristic of mires which have escaped agricultural improvement in undulating landscapes of calcareous bedrocks and drift. Particularly good stands still remain in the Breck river valleys, although some of the sites included in Haslam's (1965) survey have since been afforested. The *Carex paniculata* sub-community is well represented on the narrow alluvial flood-plains of some rivers on the Hampshire Chalk. The *Cladium* sub-community includes some of the more species-poor vegetation in the Broadland flood-plains and around the Anglesey basin mires.

Affinities

In Wheeler's (1980a) scheme, the *Angelico-Phragmitetum* was a somewhat ill-defined group which accommodated fen vegetation lacking the full range of *Peucedano-Phragmitetum* species. However, as part of a wider spectrum of both species-rich and species-poor fens, the *Phragmites-Eupatorium* community emerges here as a more integrated equivalent to this vegetation type and one which seems to occupy a fairly natural position between the *Peucedano-Phragmitetum* and the *Galium* sub-community of the *Phragmitetum*. As such it includes communities of English lowland fen vegetation described from outside Broadland (e.g. Tansley 1911, Sinker 1962, Haslam 1965, Meres Report 1980) and is equivalent to some moderately rich communities of Continental Europe.

Floristic table S25

	a	b	c	25
Phragmites australis	V (1–10)	IV (3–7)	IV (1–9)	IV (1–10)
Eupatorium cannabinum	IV (1–5)	IV (1–3)	IV (1–4)	IV (1–5)
Galium palustre	III (1–5)	IV (1–3)	III (1–3)	IV (1–5)
Cirsium palustre	III (1–2)	IV (1–3)	I (1–3)	II (1–3)
Epilobium hirsutum	III (1–5)	III (1–3)		II (1–5)
Angelica sylvestris	III (1–3)	IV (1–3)	I (1–3)	III (1–3)
Valeriana officinalis	II (1–3)	II (1–3)		II (1–3)
Vicia cracca	II (1–3)	II (1–3)		II (1–3)
Caltha palustris	II (1–3)	II (1–3)	I (1–3)	II (1–3)
Myosotis scorpioides	I (1–3)	I (1–3)		I (1–3)
Urtica dioica	I (1–3)	I (1–3)		I (1–3)
Galium uliginosum	II (1–3)	I (1–3)		I (1–3)
Calystegia sepium	II (1–3)	I (1–3)		I (1–3)
Brachythecium rutabulum	II (1–3)		I (1–5)	I (1–5)
Lychnis flos-cuculi	II (1–3)		I (1–3)	I (1–3)
Lotus uliginosus	II (1–3)			I (1–3)
Equisetum fluviatile	II (1–3)			I (1–3)
Carex riparia	I (1–3)			I (1–3)
Typha angustifolia	I (5)			I (5)
Potentilla palustris	I (2)			I (2)
Lophocolea bidentata	I (1)			I (1)
Arrhenatherum elatius	I (1)			I (1)
Athyrium filix-femina	I (2)			I (2)
Rumex crispus	I (1)			I (1)
Lathyrus pratensis	I (1)			I (1)
Galium aparine	I (1)			I (1)

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Carex paniculata	I (3)	V (1–5)	I (1–3)	II (1–5)
Salix cinerea sapling	I (1–5)	IV (1–4)	III (1–4)	II (1–5)
Carex acuta	I (1–3)	II (1–5)		I (1–5)
Scrophularia aquatica	I (1–3)	II (1–3)		I (1–3)
Phalaris arundinacea		II (1–3)		I (1–3)
Juncus subnodulosus	III (1–7)	I (1–3)	V (1–4)	III (1–7)
Cladium mariscus	I (2)		V (3–8)	II (2–8)
Carex elata			II (1–9)	I (1–9)
Myrica gale			II (1–4)	I (1–4)
Scutellaria galericulata	I (2)		II (1–3)	I (1–3)
Berula erecta			I (1–4)	I (1–4)
Thelypteris palustris			I (1–3)	I (1–3)
Oenanthe lachenalii			I (1–3)	I (1–3)
Campylium stellatum			I (1–4)	I (1–4)
Valeriana dioica			I (1–3)	I (1–3)
Pedicularis palustris			I (4)	I (4)
Rubus fruticosus agg.			I (3–4)	I (3–4)
Mentha aquatica	III (1–4)	II (1–3)	III (1–3)	III (1–4)
Lythrum salicaria	II (1–3)	III (1–3)	III (1–3)	III (1–3)
Iris pseudacorus	II (1–3)	II (1–3)	II (1–3)	II (1–3)
Filipendula ulmaria	III (1–5)	II (1–3)	II (1–3)	II (1–5)
Calliergon cuspidatum	III (1–6)	I (1–3)	II (1–5)	II (1–6)
Solanum dulcamara	I (1–3)	I (1–3)	I (1–3)	I (1–3)
Equisetum palustre	II (1–3)	I (1–3)	I (1–3)	I (1–3)
Symphytum officinale	I (1–3)	I (1–3)	I (1–3)	I (1–3)
Alnus glutinosa	I (1–5)	I (3)	I (1–3)	I (1–5)
Lycopus europaeus	I (3)		I (1–3)	I (1–3)
Hydrocotyle vulgaris	I (6)		I (1–3)	I (1–6)
Menyanthes trifoliata	I (4)		I (1–5)	I (1–5)
Number of samples	16	7	26	49
Number of species/sample	10 (6–17)	12 (5–16)	11 (6–28)	11 (6–28)

a *Phragmites australis* sub-community
b *Carex paniculata* sub-community
c *Cladium mariscus* sub-community
25 *Phragmites australis-Eupatorium cannabinum* tall-herb fen (total)

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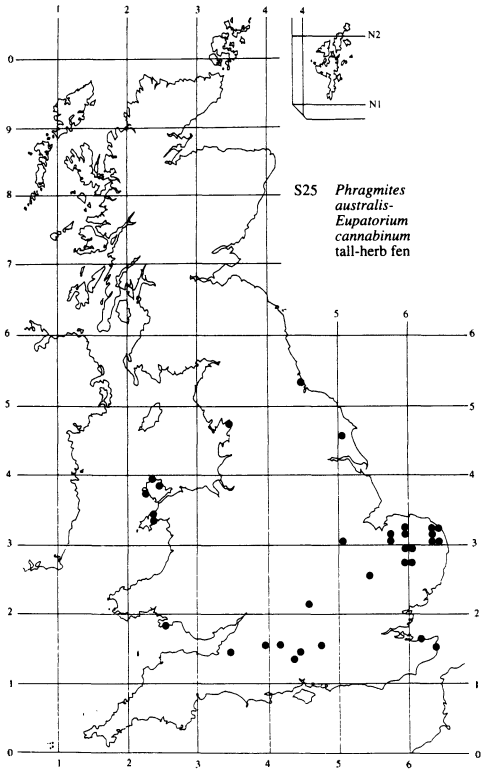

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