
A24

Juncus bulbosus community

Synonymy

Peaty moorland lochs West 1910 *p.p.*; *Juncus fluitans* consocieties Pearsall 1921; *Juncus fluitans* vegetation Pearsall 1921; *Juncus fluitans-Utricularia* sociation Spence 1964; *Juncus fluitans-Sphagnum subsecundum* sociation Spence 1964; *Sphagno-Sparganium angustifolii* Tüxen 1937 *sensu* Schoof-van Pelt 1973 *p.p.*; *Scorpidio-Utricularietum* Müller & Gors 1960 *sensu* Birse 1984 *p.p.*.

Constant species

Juncus bulbosus.

Rare species

Utricularia intermedia.

Physiognomy

Juncus bulbosus is a plant of quite high frequency and some local abundance in a variety of aquatic communities and swamps, but in the vegetation included here it tends to be the most prominent feature along with a range of rather distinctive associates. Stands of this *Juncus bulbosus* community are of varying cover and luxuriance, with *J. bulbosus* itself occurring in the forms commonly recorded as var. *fluitans*, with branches procumbent and rooting at the nodes, or in free-floating masses, often forming dense tangles.

Occasionally, stands have very little else apart from *J. bulbosus* and no other species occurs frequently throughout the community, but *Potamogeton polygonifolius* is fairly common, sometimes with quite an extensive cover of floating leaves, particularly in shallower peaty waters, and some stands, often at greater depth and on rather more silty substrates, have *P. natans*. Then, *Scirpus fluitans* may be found, frequently hard to see among the floating rush shoots, and there can be some *Callitriche hamulata* or *C. stagnalis*. *Myriophyllum alterniflorum* is characteristic of one kind of *Juncus* vegetation and may be accompanied by occasional *Potamogeton obtusifolius*, *P. gramineus* and *P. berchtoldii*, though these are not usually present at very high covers.

More striking is the occurrence of various *Utricularia* and *Sparganium* spp. Commonest among the former is what has generally been recorded as *U. vulgaris*, but what is more likely to be the less basiphilous taxon in this aggregate, *U. neglecta* (Perring 1968). This is very hard to separate from *U. vulgaris sensu stricto*, especially with vegetative material which is all that has been found in the northern part of Britain where this vegetation is most common. *U. minor* has also been seen in this community and, very rarely, *U. intermedia*, although much care needs to be taken to distinguish this from *U. ochroleuca*. This name was once used as a synonym for *U. intermedia* (e.g. Pearsall 1921), but it is clear now that there is a separate species of north European provenance, which should correctly bear this name, that occurs in Scotland, perhaps more widely than *U. intermedia* which seems to be very scarce in Britain (Rich & Rich 1988). The *Sparganium* spp. can be very difficult to identify from vegetative material too, but *S. angustifolium* appears to be the commonest, with *S. minimum* less frequent, *S. emersum* probably also occurring but not so characteristic.

Fontinalis antipyretica is sometimes found on less organic substrates, but much more distinctive in many stands of the *Juncus* community is *Sphagnum auriculatum*, probably always var. *auriculatum*, growing loosely attached or free-floating often in substantial quantities.

Sub-communities

***Utricularia vulgaris* agg. sub-community:** *Juncus fluitans* consocieties Pearsall 1921; *Juncus fluitans-Utricularia* sociation Spence 1964; *Sphagno-Utricularietum* Tüxen 1937 *sensu* Schoof-van Pelt 1973 *p.p.* *J. bulbosus* is often abundant here, but both *U. vulgaris* and *S. angustifolium*, less commonly *S. minimum*, are preferential and sometimes of high cover. *Potamogeton natans* is usually more frequent than *P. polygonifolius*, and there is quite often some *P. obtusifolius* and *M. alterniflorum*. *Callitriche hamulata* and *C. stagnalis* are occasional, with *Lobelia dortmanna* and *Nitella* spp. in some stands.

Sphagnum auriculatum occurs only very infrequently and as sparse shoots.

***Sphagnum auriculatum* sub-community:** *Juncus fluitans* vegetation Pearsall 1921; *Juncus fluitans*-*Sphagnum Subsecundum* socation Spence 1964; *Scorpidio-Utricularietum* Müller & Gors 1960 *sensu* Birse 1984 p.p., *U. vulgaris*, *U. minor*, *U. intermedia* and *S. angustifolium* occur very occasionally in this sub-community and there is sometimes *M. alterniflorum*, but the most striking feature is the constancy and often the abundance of *Sphagnum auriculatum* among the *J. bulbosus*. *Potamogeton polygonifolius* can form an open canopy of floating leaves but *P. natans* is scarce.

Habitat

The *Juncus* community is characteristic of shallower standing waters that are base-poor, oligotrophic and often peaty. It occurs widely in the sheltered parts of lakes and in small pools, though is very much commoner through the north and west of Britain.

J. bulbosus is found in most parts of the country where there are suitably infertile, generally acidic, standing waters but, in southern and eastern Britain, where such sites are anyway less common, it is often an associate of swamps and mires. The *Juncus* community is sometimes seen in these regions, often in pools among tracts of lowland heath and around valley bogs, where there is a locally high ground water table among soils derived from acidic bedrocks or drift or in accumulating peat deposits, as in The Weald, the New Forest, through the south-west of England and the north-west Midlands. It is, however, much more frequent through the uplands of the north and west, where favourable conditions are widely met in lakes in catchments of lime-poor, resistant rocks, with impoverished soils and extensive tracts of blanket mire, or in pools within the bogs themselves. And, here, the vegetation can take on a somewhat Atlantic character, with an abundance of *Sphagnum auriculatum*, or a more Continental Northern feel, the community providing a locus for *Utricularia minor*, *U. intermedia*, *U. ochroleuca* and *Sparganium angustifolium*.

Shallower, quiet waters are much preferred, the vegetation sometimes extending down to depths of more than 1 m but often occurring in less than 25 cm provided there is no wave-turbulence. Typically, however, even in such very sheltered situations, there is no deposition of more nutrient-rich silt, the substrates being usually infertile sands or peat. The generally species-poor and calcifuge nature of the vegetation is thus very obvious, reflecting pH values that are commonly between 4 and 6, with alkalinities often very much less than 25 mg l⁻¹ calcium carbonate and conductivities below 200 µmho (Spence 1964, Palmer 1992, Palmer *et al.* 1992).

The floristic differences between the sub-communities

can be related to finer variation in the fertility and base-richness of the substrates and waters. The *Utricularia* type is found in less impoverished situations, often on banks of coarse sand or peaty mud in the shallows of lakes up to 50 cm or more deep, where the pH is frequently over 5 and the conductivity more than 100 mhos. The *Sphagnum* sub-community, on the other hand, is almost exclusively seen on peat, in shallower waters among blanket mires or in small bog pools, where the pH is sometimes as low as 3.5 and the alkalinity negligible (Pearsall 1921, Spence 1964, Palmer 1989, Palmer *et al.* 1992). In such dystrophic conditions, little else but *J. bulbosus* and *S. auriculatum* can thrive.

Zonation and succession

The *Juncus* community occurs with other kinds of submerged and floating-leaved aquatic vegetation in lakes and with bog pool and soakway assemblages on mires. Emergents are sometimes found in association with the community but, in such infertile systems, these do not generally indicate any progression to swamp.

Very often, the *Utricularia* sub-community occurs among the zonations from *Littorella-Lobelia* vegetation to *Isoetes* swards in moderately shallow water, where there is no turbulence and some deposition of slightly finer and less impoverished sand among the gravel and boulders. Such banks are sometimes seen a little way offshore, just beyond the wave-torn zone, or near the mouths of input streams (Pearsall 1921) and are usually well marked by the increase in the abundance of *J. bulbosus*, sometimes with *M. alterniflorum*, and the greater prominence of *Utricularia* and *Sparganium* spp., the small rosette plants of the *Littorelletalia* vegetation being largely overwhelmed by the deposited mineral material. Patches of finer and more fertile silt in these base-poor waters usually see a shift to the *Potamogeton-M. alterniflorum* community and, though *J. bulbosus*, *Utricularia* and *Sparganium* spp. can remain occasional there, dominance is generally shared between *M. alterniflorum* and various *Potamogeton* spp. which figure only infrequently in the *Juncus* community (Pearsall 1921, Spence 1964).

Quite commonly, in these sequences, the associated *Potamogeton natans* in the *Juncus* stands thickens up to form covers of floating-leaved vegetation, and there may also be patches of the *Nymphaeetum albae*. Sparse *Scirpetum lacustris* is also frequently found growing up through the *Utricularia* sub-community: indeed, Spence (1964) found this swamp to be a good indicator of the presence of the aquatic vegetation beneath in a number of Scottish lakes.

The *Sphagnum* sub-community can sometimes be found in zonations in lake shallows, replacing the *Utricularia* type where the waters are sheltered and the substrates peaty. Then, there can be transitions to *Potamogeton-Ranunculus* soakway vegetation where

waters trickle in from adjacent stretches of mire. Often, however, the *Sphagnum* sub-community occurs in small bog pools, where it may be the only aquatic vegetation apart from *Sphagnum auriculatum* stands, these generally overwhelmingly dominated by the moss, with just occasional *J. bulbosus* and *Utricularia* spp. and species like *Menyanthes trifoliata* and *Eriophorum angustifolium* appearing frequently. *Carex rostrata* is usually the commonest emergent in such waters and it may thicken up its cover locally among *Juncus bulbosus* vegetation.

Distribution

The community is widespread and common through the north and west, with stands distributed more locally in suitable habitats in the south-east.

Affinities

Both these kinds of *J. bulbosus* vegetation have been recognised by earlier workers (Pearsall 1921, Spence 1964) but further sampling is needed to establish the complete range of floristic variation among them, and to determine whether they are best retained as sub-

divisions of a single community. Comparable vegetation from the Continent has generally been assigned to a distinct alliance, the Sphagno-Utricularion Müller & Gors 1960, sometimes grouped among the Lemnetaea (Ellenberg 1978) but generally separated off into a class of its own, the Utricularietea intermedio-minoris den Hartog & Segal 1964. Among the associations recognised, the *Juncus* community is most similar to the stands of the *Sphagno-Utricularietum ochroleucae* (Schumacher 1937) Oberdorfer 1957 and the *Sparganium minimi* Schaaf 1925 described by Oberdorfer (1977). More basiphilous bladderwort vegetation like the *Scorpidio-Utricularietum* Müller & Gors 1960 has sometimes been characterised from Britain (as in Birse 1984) but has here been subsumed as part of various base-rich mires. Both Oberdorfer (1977) and Birse (1984) retained the *Scorpidio-Utricularietum* in the Sphagno-Utricularion while Westhoff & den Held (1969) stressed the close structural relationship with Caricion davallianae vegetation (see also White & Doyle 1982).

Floristic table A24

	a	b	24
<i>Juncus bulbosus</i>	V (2–8)	V (4–10)	V (2–10)
<i>Utricularia vulgaris</i> agg.	IV (1–6)	I (2)	III (1–6)
<i>Potamogeton natans</i>	III (4–6)	I (1)	II (1–6)
<i>Sparganium angustifolium</i>	III (1–9)	I (1–8)	II (1–9)
<i>Myriophyllum alterniflorum</i>	II (4–8)	I (1–6)	I (1–8)
<i>Potamogeton obtusifolius</i>	II (4–6)		I (4–6)
<i>Nitella</i> spp.	II (4–10)		I (4–10)
<i>Lobelia dortmanna</i>	I (4–6)		I (4–6)
<i>Sparganium minimum</i>	I (4–6)		I (4–6)
<i>Callitriche hamulata</i>	I (1–5)		I (1–5)
<i>Potamogeton berchtoldii</i>	I (1–4)		I (1–4)
<i>Sphagnum auriculatum</i>	I (1–3)	IV (4–10)	III (1–10)
<i>Potamogeton polygonifolius</i>	II (1–6)	II (1–8)	II (1–8)
<i>Scirpus fluitans</i>	I (4–8)	I (2–9)	I (2–9)
<i>Utricularia minor</i>	I (1–4)	I (4–6)	I (1–6)
<i>Glyceria fluitans</i>	I (1–4)	I (4)	I (1–4)
<i>Callitriche stagnalis</i>	I (4–5)	I (1)	I (1–5)
<i>Potamogeton gramineus</i>	I (4)	I (8)	I (4–8)
Number of samples	27	42	69
Number of species/sample	5 (3–9)	3 (1–7)	4 (1–9)

a *Utricularia vulgaris* agg. sub-community

b *Sphagnum auriculatum* sub-community

24 *Juncus bulbosus* community (total)