SD14
Salix repens-Campylium stellatum dune-slack community

Synonymy
Sandscale *Salix repens* dunes Pearsall 1934; *Campylium stellatum-Salix repens* nodum Jones 1992; *Carex flacca*-Thalloid Liverwort nodum Jones 1992 *p.p.*

Constant species
Agrostis stolonifera, *Carex flacca*, *Epipactis palustris*, *Equisetum variegatum*, *Hydrocotyle vulgaris*, *Mentha aquatica*, *Salix repens*, *Calliergon cuspidatum*, *Campylium stellatum.*

Rare species
Dactylorhiza majalis ssp. *praetermissa* and ssp. *purpurella*, *Juncus acutus*, *Liparis loeselii*, *Pyrola rotundifolia.*

Physiognomy
The *Salix repens-Campylium stellatum* community comprises generally closed vegetation of dune slacks with an often extensive low bushy carpet of *S. repens*, frequently species-rich assemblages of vascular associates and a usually extensive carpet of bryophytes among which both *Campylium stellatum* and *Calliergon cuspidatum* figure very commonly, the former generally especially abundant.

The constant combination of *Carex flacca*, *Equisetum variegatum* and, in most sub-communities, *Epipactis palustris* with more widely occurring dune-slack plants such as *Hydrocotyle vulgaris*, *Agrostis stolonifera* and *Mentha aquatica*, is what gives this vegetation its particular character. Among these species, *E. variegatum* can be especially abundant and it sometimes assumes a striking tussock growth-form, perhaps because of rapid shoot proliferation in the early stages of colonisation (Jones 1992). Also, as with the *Salix-Calliergon* community, the only occasional occurrence of *Potentilla anserina* and *Carex nigra* here, and the generally low cover of the latter, is an important contrast with the *Potentilla-Carex* slack vegetation.

Among the other commoner associates, *Carex arenaria*, *Leontodon autumnalis*, *Ranunculus flammula*, *Rubus caesius*, *Lotus corniculatus* and *Juncus articulatus* are the most frequent with more occasional *Taraxacum officinale* agg. and *Equisetum palustre*. *Glaux maritima*, *Juncus gerardii* and *J. maritimus* figure at low frequencies and locally an abundance of *Phragmites australis*, *Cladium mariscus* and *Juncus acutus* can give stands a striking individuality. Though not represented among our data, *Schoenus nigricans* can also figure prominently in this vegetation. *Samolus valerandi* is a nationally scarce plant that occurs here and the community also provides a locus at a few sites for the rare *Liparis loeselii.*

Along with *Campylium stellatum* and *Calliergon cuspidatum*, other distinctive bryophytes occurring occasionally throughout are *Drepanocladus sendtneri*, *D. lycopodioides* and *Riccardia chamaedryfolia.*

Sub-communities

***Carex serotina-Drepanocladus sendtneri* sub-community.** *C. flacca* is joined here by *C. arenaria* and, especially distinctive, *C. serotina*, with occasional *Eleocharis palustris* and *Dactylorhiza majalis* ssp. *purpurella*. Also frequent, though less strongly preferential, are *Ranunculus flammula* and *Juncus articulatus*. *Drepanocladus sendtneri* is a little more frequent here than elsewhere in the community.

***Rubus caesius-Galium palustre* sub-community:** *Campylium stellatum-Salix repens* nodum, Typical and *Carex nigra* sub-types Jones 1992. *Carex arenaria*, *Ranunculus flammula* and *Juncus articulatus* remain very common here and *Leontodon autumnalis* also appears among the constants. More striking, though, is the preferential frequency of *Rubus caesius* and *Galium palustre* and, more occasionally, *Carex nigra.*

***Bryum pseudotriquetrum-Aneura pinguis* sub-community:** *Carex flacca*-Thalloid Liverwort nodum Jones 1992 *p.p.* In this, the most particular kind of *Salix-Campylium* vegetation, the vascular contingent has pref-

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erentially frequent records for *Juncus articulatus* and *Lotus corniculatus* and is additionally enriched by *Poa pratensis*, *Prunella vulgaris*, *Leontodon hispidus*, *Euphrasia officinalis* agg., *Linum catharticum* and *Anagallis tenella*. Equally distinctive among the extensive bryophyte carpet is the constancy of *Bryum pseudotriquetrum* and a range of thalloid liverworts including *Pellia endiviifolia*, *Aneura pinguis* and, more occasionally, *Moerckia hibernica* and *Preissia quadrata*.

***Festuca rubra* sub-community:** *Campylium stellatum-Salix repens* species-rich nodum, dry sub-type Jones 1992 *p.p. Leontodon autumnalis*, *Lotus corniculatus*, *Poa pratensis*, *Prunella vulgaris* and *Rubus caesius* all remain frequent here but the sward has a grassier look, with *Festuca rubra* and *Holcus lanatus* constant at sometimes moderate to high cover and *Trifolium repens* and *T. pratense* are also very common. *Pulicaria dysenterica* is especially distinctive among the preferentials and there is occasional *Ranunculus repens*, *R. acris*, *Lotus uliginosus* and *Sonchus arvensis*. *Brachythecium rutabulum* is frequent in the bryophyte mat.

Habitat

The *Salix-Campylium* community is a scarce vegetation type found in slacks of young to moderate age and kept moist by fluctuations in quite base-rich ground waters.

As slacks go, this type includes much of the more calcicolous vegetation found on British dune systems and values for calcium concentration of well in excess of 40 mg l^{-1} (comparable with some inland Caricion davallianae fens) have been recorded in this kind of situation (Gorham 1958, Jones 1967). Yet, as Jones (1992) points out, the contingent of more base-demanding plants here is relatively modest. It is possible, then, that some other hydrological factor inhibits the expression of this aspect of the vegetation, perhaps the considerable range in fluctuation of the water-table. In comparable systems in The Netherlands, for example, van der Laan (1979) showed that the summer water-table was between 10 and 60 cm below the surface with a possibility of superficial drought in warmer summers (Jones 1992). Winter flooding in this kind of slack can attain from 10 to 50 cm in depth, but typically it is not so long-lasting as in the *Salix-Calliergon* community. One other important factor is the deficiency in major nutrients in slacks (Willis & Yemm 1961, Willis 1963), perhaps even more marked than in inland Caricion davallianae fens (Jones 1992).

The youngest type of *Salix-Campylium* vegetation is the *Bryum-Aneura* sub-community (Jones 1992) where the *Campylium* carpet is not yet too extensive or thick, thus allowing the thalloid liverworts to thrive. In fact, it seems that the moss mat can develop here relatively quickly – in 35 years or so in some Kenfig slacks, for example (Jones 1992) – and as soon as it attains 5 cm, the thalloid liverworts typically of the *Bryum-Aneura* sub-community are virtually extinguished.

The differences between the habitats of the three other sub-communities are unclear, though the *Festuca-rubra* sub-community is perhaps characteristic of drier situations. As with other dune-slack communities, grazing by stock and rabbits may play some part in determining the floristics and physiognomy of the vegetation.

Zonation and succession

The *Salix-Campylium* community typically occupies slacks of moderate wetness in systems with a range of ground-water conditions, generally between ridges with various *Festuca-Galium* or *Ammophila-Festuca* swards. It is probably maintained by continuing winter flooding but any tendency to drying is marked by eventual progression to woodland.

Within individual slacks, depressions of natural or artificial origin where the moss carpet is opened up, can have local stands of the *Bryum-Aneura* sub-community among other kinds of *Salix-Campylium* vegetation. Drier stands can pass to the *Salix-Holcus* community or directly to *Festuca-Galium* swards on the dune-ridges around, a generally sharp shift with the change in ground moisture conditions.

Successional change within the community sees the *Bryum-Aneura* type giving way to other sub-communities and, in this process, the development of a tussock habit in *Equisetum variegatum* may play a distinctive part in the two or three decades it can take for *Salix repens* to form a dominant canopy (Hope-Simpson & Yemm 1979). As tussocks grow and fuse, creeping and stoloniferous species infilling any remaining spaces, it seems that the surface of the vegetation mat elevates perhaps several decimetres (Jones 1992).

Distribution

This is an uncommon community, occurring locally around the English and Welsh coasts, more sparsely still in Scotland.

Affinities

Vegetation similar to this has been described from calcareous dune slacks in The Netherlands (Westhoff 1947, Duvigneaud 1947, van der Maarel & Westhoff 1964, Van der Laan 1979), some of it included in the *Pyrolo-Salicetum* Meltzer 1941, some in the *Junco baltici-Schoenetum nigricantis* Westhoff 1946. More recently, Schaminée *et al.* (1995) have provided a new description of the *Junco baltici-Schoenetum* Westhoff ex Westhoff & van Oosten 1991 with a floristic profile very similar to that of the *Salix-Campylium* community, apart from the consistent prominence there of *Schoenus nigricans* and infrequent occurrence of *Juncus balticus*.

Floristic table SD14

	a	b	c	d	14
Salix repens	V (1–10)	V (3–9)	V (3–9)	V (3–9)	V (1–10)
Campylium stellatum	V (2–10)	V (3–10)	V (3–10)	IV (1–10)	V (1–10)
Hydrocotyle vulgaris	V (3–8)	V (3–10)	IV (1–7)	V (1–10)	V (1–10)
Equisetum variegatum	IV (3–9)	V (2–10)	IV (3–10)	V (3–8)	V (2–10)
Carex flacca	III (1–8)	V (1–5)	V (3–8)	V (1–5)	V (1–8)
Agrostis stolonifera	III (1–5)	V (1–6)	V (1–8)	IV (1–5)	IV (1–8)
Mentha aquatica	IV (1–5)	V (1–7)	III (1–4)	IV (1–6)	IV (1–7)
Calliergon cuspidatum	III (1–9)	IV (1–10)	IV (1–6)	V (1–10)	IV (1–10)
Epipactis palustris	II (1–5)	V (1–6)	IV (1–5)	IV (1–5)	IV (1–6)
Carex arenaria	IV (1–5)	V (1–5)	III (1–4)	II (1–4)	III (1–5)
Drepanocladus sendtneri	III (1–10)	II (1–10)	II (1–4)	I (2–6)	II (1–10)
Carex serotina	III (1–5)	I (1–3)	II (2–4)	I (1–3)	II (1–5)
Eleocharis palustris	II (1–4)	I (2–3)		I (1)	I (1–4)
Dactylorhiza majalis purpurella	I (1–2)				I (1–2)
Centaurium pulchellum	I (1)				I (1)
Leontodon autumnalis	I (1–2)	IV (1–5)	IV (1–5)	IV (1–5)	III (1–5)
Ranunculus flammula	III (1–4)	IV (1–4)	III (1–4)	II (1–4)	III (1–4)
Rubus caesius	II (1–5)	IV (1–8)	II (1–5)	III (1–5)	III (1–8)
Galium palustre	I (1–3)	IV (1–4)	I (2)	I (1–3)	II (1–4)
Carex nigra	I (1–9)	II (1–8)	I (5)	I (1–5)	I (1–9)
Lotus corniculatus	I (1–4)	III (1–5)	V (1–5)	IV (1–5)	III (1–5)
Juncus articulatus	III (1–5)	III (1–9)	IV (1–5)	II (1–4)	III (1–9)
Poa pratensis		I (1–3)	IV (1–5)	V (1–6)	II (1–6)
Prunella vulgaris	I (1–3)	I (1–3)	IV (1–5)	III (1–6)	II (1–6)
Leontodon hispidus	II (1–6)	I (1–5)	IV (1–5)	II (2–5)	II (1–6)
Pellia endiviifolia	I (1–5)	I (3)	IV (1–6)	II (1–6)	II (1–6)
Bryum pseudotriquetrum	I (1–5)	I (1–2)	V (1–8)	I (1–4)	II (1–8)
Aneura pinguis	I (1–4)	I (1–3)	IV (1–6)	I (1–3)	I (1–6)
Linum catharticum	I (1–4)	I (1–3)	III (1–3)	I (1–3)	I (1–4)
Euphrasia officinalis agg.	I (1–3)	I (1–3)	II (1–4)	I (1–4)	I (1–4)
Anagallis tenella	I (1–5)	I (1–4)	II (1–4)	I (1–4)	I (1–5)

Moerckia hibernica	I (1–3)		II (1–3)	I (3)	I (1–3)
Preissia quadrata	I (1–4)		II (1–6)		I (1–6)
Leiocolea badensis			II (3–10)		I (3–10)
Carex hirta			I (1–4)		I (1–4)
Equisetum arvense			I (1–3)		I (1–3)
Festuca rubra	I (1–3)	I (1–3)	II (1–6)	V (1–9)	II (1–9)
Holcus lanatus	I (3)	I (1)	III (1–6)	IV (1–5)	II (1–6)
Pulicaria dysenterica		I (1–2)	II (1–8)	IV (1–8)	II (1–8)
Trifolium pratense	I (3)	I (1–5)	I (1–5)	IV (2–8)	II (1–8)
Trifolium repens	I (2–5)	II (1–5)	III (2–5)	III (1–4)	II (1–5)
Brachythecium rutabulum		I (4)	II (1–7)	III (3–9)	I (1–9)
Ranunculus repens		I (1–3)	I (1–3)	III (1–4)	I (1–4)
Danthonia decumbens	I (2-3)	I (1–3)	I (1–3)	II (1–5)	I (1–5)
Ranunculus acris	I (3)	I (1)	I (1)	II (1–4)	I (1–4)
Sonchus arvensis		I (2)	I (1)	II (1–5)	I (1–5)
Lotus uliginosus		I (2–5)		II (1–6)	I (1–6)
Plantago lanceolata			I (2–3)	II (1–5)	I (1–5)
Lophocolea bidentata			I (3)	II (1–4)	I (1–4)
Eupatorium cannabinum				I (1–4)	I (1–4)
Eurhynchium praelongum				I (1–4)	1 (1–4)
Dactylorhiza incarnata				I (1–3)	I (1–3)
Angelica sylvestris				I (1–3)	I (1–3)
Briza media				I (2–4)	I (2–4)
Potentilla anserina	II (1–5)	II (1–5)	I (1–5)	II (1–5)	II (1–5)
Equisetum palustre	I (1–4)	II (1–4)	I (3–5)	II (1–4)	II (1–5)
Taraxacum officinale agg.	I (3)	I (1–2)	II (1–3)	II (1–3)	I (1–3)
Dactylorhiza majalis praetermissa	I (1–3)	I (1–2)	I (1–3)	I (1–3)	I (1–3)
Glaux maritima	I (1–4)	I (1–3)	I (1–4)	I (1–3)	I (1–4)
Lycopus europaeus	I (1–3)	I (1–4)	I (3)	I (1–5)	I (1–5)
Phragmites australis	I (1–5)	I (1–4)	I (8–10)	I (2–10)	I (1–10)
Carex panicea	I (3–6)	I (4)	I (7)	I (4–8)	I (3–8)
Riccardia chamaedryfolia	I (1–3)	I (1–3)	I (3)	I (1–3)	I (1–3)
Ophioglossum vulgatum	I (1–2)	I (1–4)		I (1–3)	I (1–4)
Eleocharis quinqueflora	I (1–4)	I (1–3)	I (1–3)		I (1–4)
Senecio jacobaea	I (1–2)		I (1–2)	I (1–4)	I (1–4)

Floristic table SD14 (*cont.*)

	a	b	c	d	14
Bellis perennis	I (2–4)		I (1–3)	I (1–3)	I (1–4)
Drepanocladus lycopodiodes	I (1–10)	I (10)		I (5)	I (1–10)
Oenanthe lachenalii	I (1)	I (2)		I (1–3)	I (1–3)
Liparis loeselii	I (1–4)	I (1–3)	I (3)		I (1–4)
Plantago major	I (1)		I (1)	I (1)	I (1)
Polygala vulgaris	I (1)		I (1–2)	I (2)	I (1–2)
Juncus gerardii	I (4)	I (4)		I (1–3)	I (1–4)
Juncus maritimus	I (3)	I (1–3)	I (5)		I (1–5)
Equisetum fluviatile	I (1–2)	I (3)		I (2)	I (1–3)
Salix caprea	I (2)	I (1–3)		I (1)	I (1–3)
Pseudoscleropodium purum	I (2)		I (5)	I (1)	I (1–5)
Juncus acutus	I (1)	I (1)		I (5)	I (1–5)
Plantago coronopus	I (3–4)		I (4–6)		I (3–6)
Cladium mariscus	I (8–9)	I (4–8)			I (4–9)
Epilobium parviflorum	I (1)	I (2–5)			I (1–5)
Samolus valerandi	I (1–3)		I (1)		I (1–3)
Sagina nodosa	I (1–2)		I (1–3)		I (1–3)
Blackstonia perfoliata	I (1–3)		I (1)		I (1–3)
Drepanocladus aduncus	I (1–4)		I (8)		I (1–8)
Carex demissa	I (6)		I (4)		I (4–6)
Leontodon taraxacoides	I (3–4)			I (1–2)	I (1–4)
Trifolium fragiferum	I (3)			I (3)	I (3)
Anthoxanthum odoratum	I (2)			I (2)	I (2)
Carex hostiana	I (2)			I (5)	I (2–5)
Senecio erucifolius		I (1)		I (3–4)	I (1–4)
Carex caryophyllea		I (2)		I (5)	I (2–5)
Juncus inflexus		I (2)		I (3)	I (2–3)
Pyrola rotundifolia			I (1–5)	I (1–6)	I (1–6)
Gymnadenia conopsea			I (1)	I (1–3)	I (1–3)
Hippophae rhamnoides			I (1–4)	I (1)	I (1–4)
Fragaria vesca			I (1)	I (1–4)	I (1–4)
Gentianella amarella			I (1–2)	I (3)	I (1–3)

Anthyllis vulneraria			I (1)	I (1)	I (1)
Parnassia palustris			I (2–4)	I (3)	I (2–4)
Rhinanthus minor			I (2)	I (1–3)	I (1–3)
Succisa pratensis			I (2)	I (4–5)	I (2–5)
Viola riviniana			I (1)	I (1–2)	I (1–2)
Number of samples	70	85	34	57	246
Number of species/sample	14 (8–27)	17 (10–24)	24 (14–42)	23 (12–31)	19 (8–42)

a *Carex serotina-Drepanocladus sendtneri* sub-community
b *Rubus caesius-Galium palustre* sub-community
c *Bryum pseudotriquetrum-Aneura pinguis* sub-community
d *Festuca rubra* sub-community
14 *Salix repens-Campylium stellatum* dune-slack (total)