SD15
Salix repens-Calliergon cuspidatum dune-slack community

Synonymy
Calliergon cuspidatum-Salix repens noda Jones 1992.

Constant species
Hydrocotyle vulgaris, *Mentha aquatica*, *Salix repens*, *Calliergon cuspidatum*.

Physiognomy
The *Salix repens-Calliergon cuspidatum* dune-slack community shares, with the *Salix-Campylium* vegetation, the high frequency of *Salix repens*, *Hydrocotyle vulgaris*, *Mentha aquatica* and *Calliergon cuspidatum* but the other vascular constants of that assemblage, *Carex flacca*, *Agrostis stolonifera*, *Equisetum variegatum* and *Epipactis palustris*, are of more restricted occurrence here and *Campylium stellatum* is extremely scarce.

Also, with more frequent records throughout for *Galium palustre*, *Epilobium palustre*, *Equisetum palustre* and *Lotus uliginosus*, the overall stamp of the vegetation tends to be like a poor fen rather than a rich fen. Also occasional in the community are *Festuca rubra* and *Poa pratensis* with local enrichment from tall herbs such as *Iris pseudacorus*, *Filipendula ulmaria* and *Phragmites australis*.

Apart from *Calliergon cuspidatum*, which is usually extremely abundant in a thick carpet, there are no frequent bryophytes and the striking contingent of calcicolous thalloid liverworts characteristic of some kinds of *Salix-Campylium* dune-slack is never present.

Sub-communities

***Carex nigra* sub-community:** *Calliergon cuspidatum-Salix repens* noda, species-poor sub-type Jones 1992. Both *Rubus caesius* and *Galium palustre* are constant here but more strongly preferential are *Carex nigra* and *Scutellaria galericulata* with occasional *Lysimachia vulgaris* and *Equisetum fluvitile*.

***Equisetum variegatum* sub-community:** *Campylium stellatum-Salix repens* nodum, *Equisetum variegatum* sub-type Jones 1992 *p.p.* It is here and in the next sub-community that the *Salix-Calliergon* community comes closest to the *Salix-Campylium* type with frequent records for *Agrostis stolonifera*, *Equisetum variegatum*, *Carex flacca* and *Epipactis palustris* but *Campylium stellatum* itself is still only very scarce. However, *Carex nigra* and *Galium palustre* remain very common and there is often some *Carex arenaria*, *Potentilla anserina* and *Ranunculus repens*. *Cladium mariscus* is a scarce but sometimes locally abundant associate.

***Carex flacca-Pulicaria dysenterica* sub-community:** *Calliergon cuspidatum-Salix repens* noda, Herb-rich subtype Jones 1992 *p.p. Agrostis stolonifera*, *Equisetum variegatum*, *Carex flacca* and *Epipactis palustris* all remain very frequent in this kind of *Salix-Calliergon* vegetation but *Carex flacca* becomes more common and *Pulicaria dysenterica*, *Eupatorium cannabinum* and *Ranunculus flammula* and, more occasionally, *Oenanthe lachenalii* are preferential.

***Holcus lanatus-Angelica sylvestris* sub-community.** *Rubus caesius*, *Carex flacca*, *Pulicaria dysenterica* and *Eupatorium cannabinum* remain frequent here but more diagnostic are *Holcus lanatus*, *Angelica sylvestris* and *Succisa pratensis* and, less commonly, *Molinia caerulea*, *Cirsium palustre* and *Vicia sativa* ssp. *nigra*. Also, *Phragmites australis* is quite frequent and locally abundant giving a fen-like stamp to the vegetation. In a few localities, a local abundance of *Juncus acutus* is distinctive.

Habitat
The *Salix-Calliergon* community is characteristic of older dune slacks kept very wet by prolonged flooding with circumneutral ground-waters.

Lengthy inundation through the year is essential for the development of this kind of vegetation: at Braunton Burrows, for example, Willis *et al.* (1959*b*) encountered it in slacks flooded for up to 8 months and Jones (1992) drew a parallel with the *Carex-Calliergon* vegetation of inland

fens where similar assemblages are sustained by fluctuations of small amplitude, at most from 5 cm above the surface to 40 cm below. Critically, the rooting zone is only rarely out of contact with the capillary fringe of the water table (Jones 1992). Such prolonged wetness and the shade cast by the often dense *Salix repens* cover encourage the luxuriant development of the shade-tolerant *Calliergon cuspidatum*, the thick mat of which is itself inimical to the invasion of less competitive plants. This is often a more species-poor assemblage than the *Salix-Campylium* community, for example and, more particularly, it lacks the thalloid liverworts which depend on the more open conditions typical of that kind of slack vegetation.

It is also somewhat less calcicolous than the *Salix-Campylium* community which suggests that the ground waters here are less base-rich, tending perhaps to values below pH 6 which are characteristic of the *Potentilla-Carex* community. At Braunton Burrows, for example, Willis (1985*a*) found calcium levels substantially lower beneath this kind of vegetation than in the sand around which carried *Ammophila*: less than 50 mg g^{-1}, compared to over 70 mg g^{-1}. Sodium and potassium levels, though, were quite high. Similarities to poor-fen vegetation are best seen here in the *Carex nigra* sub-community whereas, in the *Equisetum* and *Carex flacca-Pulicaria* sub-communities, the presence of plants such as *Equisetum variegatum* and *Epipactis palustris* suggests slightly more base-rich conditions. The differences between these last two types of *Salix-Calliergon* vegetation may also relate to the frequency of ground-water fluctuations. The *Equisetum* sub-community, for example, has something of the look of an inundation grassland that experiences more frequent variation in surface wetness.

Conditions akin to those in tall-herb fens, with some moderate enrichment with major nutrients, are perhaps most typical of the *Holcus-Angelica* sub-community, here, particularly where *Phragmites* is present in abundance. However, an additional factor of importance in this kind of *Salix-Calliergon* vegetation may be grazing. Stock or rabbits may actually be effective in hindering the development of a thick and extensive carpet of *Calliergon* in this community (Jones 1992) but, once free of such predation, the maintenance of wet conditions could encourage the spread of helophytes, bulky grasses and tall dicotyledons.

Zonation and succession

The *Salix-Calliergon* community typically occupies older and wetter slacks among stabilised dune systems, quite commonly with other types of slack vegetation in younger and drier hollows disposed according to the age of the dune ridges and the variation in the water-table (Figure 16). Transitions to surrounding dune grasslands depend on the configuration of the slacks and ridges. The high water-table and extensive moss carpet of this vegetation inhibit colonisation by shrubs and trees but, in drier conditions, grazing by stock and rabbits may also be important in setting back succession.

Where there is variation in hydrological conditions within individual large slacks, different types of *Salix-Calliergon* vegetation can be found in close proximity, grading the one into the other. Sometimes, too, where conditions become somewhat drier, this kind of slack assemblage can grade through the *Equisetum* sub-community to the *Carex flacca* sub-community of the *Potentilla-Carex* slack.

In the opposite direction, where slacks contain stretches of permanent open water, the *Holcus-Angelica* sub-community can pass to some kind of *Phragmites-Eupatorium* fen, *Phragmites* swamp or the *Eleocharitetum palustris*, more particularly the *Littorella* sub-community.

The *Salix-Calliergon* community seems characteristic of late stages in succession (van der Laan 1979): at Kenfig Jones (1992) noted that stands appeared to have taken many years to develop and had not changed noticeably in 8 years. Where the ground continues to be flooded for considerable periods, it seems likely that this kind of vegetation might have some stability. However, where woody plants do get a hold, it is generally *Salix cinerea*, *S. caprea* and *Betula pubescens* that colonise first, giving rise to some type of *Salix-Betula-Phragmites* or *Salix-Galium* woodland. In some sites, patches of these can be seen among stands of *Salix-Calliergon* vegetation.

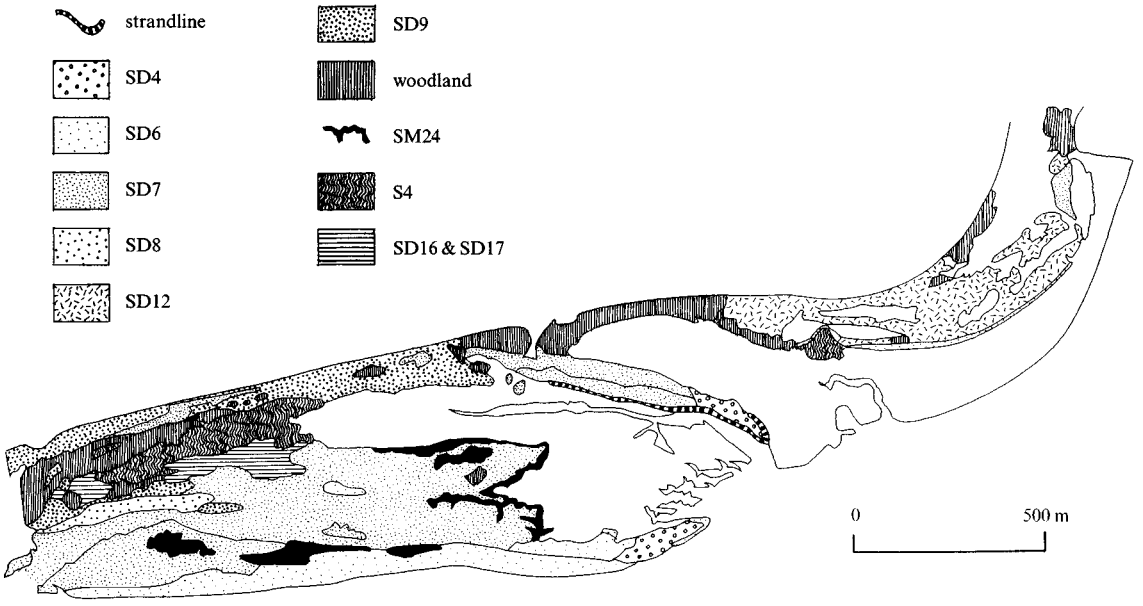
Distribution

The *Salix-Calliergon* community is one of the more widely distributed kinds of slack vegetation found, for example, on most Welsh dune systems which have slacks, scattered around the coast of England and occurring locally in Scotland.

Affinities

Vegetation of this general type with *Salix repens*, *Carex nigra* and *Calliergon cuspidatum* has been described previously from various sites in Britain (Blanchard 1952, Willis *et al.* 1959*b*, Ranwell 1960*a*) and from the Voorne dunes in The Netherlands by van der Maarel & Westhoff (1964). The latter authors provisionally considered the Dutch vegetation to be part of the *Acrocladio-Salicetum* Braun-Blanquet & de Leeuw 1936, an association of the Caricion davallianae. Following Westhoff & den Held (1969), Schaminée *et al.* (1995) incorporate this assemblage into the *Junco baltici-Schoenetum* Westhoff 1943 and describe a new association, the *Equiseto variegati-Salicetum repentis* Westhoff & Schaminée 1995, which seems more like some kinds of *Salix-Calliergon* slack. Despite its only moderately calcicolous character, the Caricion davallianae seems to be the most appropriate alliance in which to include the community.

Figure 16. Slacks and swamps in the dune system at Crymlyn Burrows, South Wales.
Well-developed SD2 *Honkenya-Cakile* vegetation is not present at this site, though there is a persistent kind of strandline interface around parts of the extensive embayments of salt-marsh, some of which is clearly SM24 *Atriplici-Elymetum pycnanthi*. Most of the more mobile dunes are occupied by various kinds of SD6 *Ammophila* vegetation, with a small area of SD4 *Elymus farctus* foredune at the seaward point of the main spit. Behind are extensive stretches of the SD7 *Ammophila-Festuca* community on semi-fixed sand with SD8 *Festuca-Galium* grassland on some areas of fixed dunes, SD12 *Carex-Festuca-Agrostis* grassland on more acid sands where there is grazing. Much of the less heavily grazed dune hinterland has SD9 *Ammophila-Arrhenatherum* vegetation widely colonised by various kinds of scrub. Low-lying areas with a high water table have SD15 *Salix-Calliergon*, SD16 *Salix-Holcus* and SD17 *Potentilla-Carex* vegetation distributed according to the degree of wetness and the base status of the flooding waters. The slacks are backed by extensive areas of S4 *Phragmites* swamp which pass to salt-marsh through the *Oenanthe* sub-community of SM18 *Juncus maritimus* vegetation. (Redrawn from Dargie 1990, by permission of the Joint Nature Conservation Committee)



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Floristic table SD15

	a	b	c	d	15
Salix repens	V (1–10)	V (3–10)	V (3–10)	V (1–10)	V (1–10)
Calliergon cuspidatum	V (1–10)	V (3–10)	V (4–10)	IV (4–10)	V (1–10)
Hydrocotyle vulgaris	V (1–9)	V (3–9)	V (1–10)	III (1–6)	V (1–10)
Mentha aquatica	IV (1–7)	V (1–7)	IV (1–7)	IV (2–6)	IV (1–7)
Rubus caesius	V (1–8)	V (1–8)	I (1–5)	III (1–8)	III (1–8)
Galium palustre	IV (1–5)	V (1–5)	III (1–4)	I (1–2)	III (1–5)
Carex nigra	IV (1–10)	III (1–7)	II (3–5)	II (2–6)	III (1–10)
Scutellaria galericulata	III (1–4)	II (1–4)		I (2)	II (1–4)
Lysimachia vulgaris	II (3–7)				I (3–7)
Equisetum fluviatile	II (2–5)				I (2–5)
Agrostis stolonifera	II (1–4)	IV (1–8)	IV (1–4)	II (3–6)	III (1–8)
Carex arenaria	II (1–4)	IV (1–5)	III (1–7)	II (1–5)	III (1–7)
Equisetum variegatum	I (1–7)	IV (2–9)	V (2–9)	I (1–2)	III (1–9)
Potentilla anserina	II (1–5)	III (1–6)	II (1–4)	I (2–5)	II (1–6)
Ranunculus repens	I (1–5)	III (1–6)	II (1–4)	I (1–3)	II (1–6)
Trifolium repens		II (1–7)	I (3–5)	I (2–4)	I (1–7)
Parnassia palustris		I (3–6)			I (3–6)
Linum catharticum		I (2)			I (2)
Homalothecium lutescens		I (4–5)			I (4–5)
Cladium mariscus		I (7–9)			I (7–9)
Carex flacca	I (1–4)	III (1–5)	V (1–5)	III (2–4)	III (1–5)
Epipactis palustris	I (3–4)	III (1–6)	IV (1–8)	I (1–4)	II (1–8)
Pulicaria dysenterica	I (1–4)	I (1–3)	IV (1–6)	IV (1–6)	II (1–6)
Eupatorium cannabinum	I (1–8)	I (1–2)	III (1–4)	III (1–6)	II (1–8)
Ranunculus flammula	I (1–4)	II (1–3)	III (1–3)	I (1–3)	II (1–4)
Oenanthe lachenalii			II (1–3)	I (1)	I (1–3)
Glaux maritima			I (2–4)		I (2–4)
Holcus lanatus	I (1–4)	I (1–3)	II (1–4)	IV (1–7)	II (1–7)
Angelica sylvestris	I (1–4)	I (4)	I (1–4)	IV (1–4)	II (1–4)
Phragmites australis	I (1–5)	I (4)	I (1–5)	III (2–10)	II (1–10)

Floristic table SD15 (*cont.*)

	a	b	c	d	15
Succisa pratensis			II (1–5)	III (1–6)	II (1–6)
Molinia caerulea		I (1)	I (1–2)	III (3–8)	II (1–8)
Eurhynchium praelongum	I (3)	I (3–5)	I (3)	II (3–8)	I (3–8)
Juncus acutus	I (8)	I (1)	I (3–5)	II (1–5)	I (1–8)
Cirsium palustre	I (1–5)		I (1–4)	II (1–5)	I (1–5)
Salix caprea		I (3)	I (1–4)	II (1–7)	I (1–7)
Lotus corniculatus		I (1–5)	I (2–4)	II (3–7)	I (1–7)
Vicia sativa nigra			I (3)	II (1–2)	I (1–3)
Vicia cracca				I (4)	I (4)
Arrhenatherum elatius				I (3–5)	I (3–5)
Equisetum palustre	IV (1–9)	II (1–4)	II (1–5)	IV (1–6)	III (1–9)
Lotus uliginosus	II (1–5)	II (1–5)	II (1–5)	III (1–4)	II (1–5)
Epilobium palustre	I (1–3)	II (1–3)	I (1–3)	II (1–4)	II (1–4)
Festuca rubra	I (1–5)	I (2–4)	II (1–8)	II (1–5)	I (1–8)
Poa pratensis	I (1–5)	I (1–3)	II (1–8)	II (1–8)	I (1–8)
Juncus maritimus		I (3–4)	II (4–8)	II (3–7)	I (3–8)
Juncus articulatus	I (1–3)	I (2–4)	I (1–3)	I (1–2)	I (1–4)
Lycopus europaeus	I (1–4)	I (2–4)	I (1–4)	I (4–6)	I (1–6)
Prunella vulgaris	I (3)	I (3–4)	I (1–4)	I (1–3)	I (1–4)
Juncus inflexus	I (1–5)	I (1–4)	I (1–2)	I (1–6)	I (1–6)
Iris pseudacorus	I (1–5)	I (1)	I (1–2)	I (4)	I (1–5)
Filipendula ulmaria	I (1)	I (2–3)	I (1)	I (1–8)	I (1–8)
Cardamine pratensis	I (1–4)	I (2–3)	I (3)		I (1–4)
Ranunculus acris	I (1–2)	I (2–3)	I (1–4)		I (1–4)
Potentilla reptans	I (1–5)	I (1–5)		I (1–3)	I (1–5)
Lychnis flos-cuculi	I (1–5)	I (1–4)		I (3–5)	I (1–5)
Drepanocladus sendtneri	I (3–10)	I (1–5)	I (3)		I (1–10)
Ophioglossum vulgatum	I (1–5)	I (1–4)		I (2–3)	I (1–5)
Dactylorhiza incarnata	I (1)	I (1–3)	I (1)		I (1–3)
Campylium stellatum	I (10)	I (3–10)	I (6–8)		I (3–10)
Carex panicea	I (2–4)	I (2)		I (2)	I (2–4)
Equisetum arvense	I (1–4)	I (3)		I (2–3)	I (1–4)

Dactylorhiza majalis praetermissa	I (1)	I (1–3)	I (1–3)		I (1–3)
Eleocharis palustris	I (1–3)	I (1–2)	I (1)		I (1–3)
Danthonia decumbens	I (4)	I (4)	I (2–3)		I (2–4)
Anagallis tenella		I (3)	I (1–3)	I (1)	I (1–3)
Lathyrus pratensis	I (1)	I (2–3)		I (3)	I (1–3)
Pseudoscleropodium purum		I (3)	I (6)	I (4–5)	I (3–6)
Senecio jacobaea		I (2)	I (1–2)	I (1)	I (1–2)
Cirsium arvense	I (2–3)		I (3)	I (1–3)	I (1–3)
Juncus subnodulosus	I (6)		I (3)	I (7–8)	I (3–8)
Solanum dulcamara	I (1)	I (1)		I (5)	I (1–5)
Agrostis capillaris	I (3)	I (2–4)			I (2–4)
Epilobium parviflorum	I (2–5)	I (1–2)			I (1–5)
Carex hirta	I (3–4)	I (1–4)			I (1–4)
Caltha palustris	I (3)	I (4–5)			I (3–5)
Drepanocladus lycopodiodes	I (1)	I (5–7)			I (1–7)
Lophocolea bidentata	I (3–4)			I (3–4)	I (3–4)
Agrimonia eupatoria	I (4)			I (1)	I (1–4)
Eriophorum angustifolium	I (3–5)		I (3)		I (3–5)
Scirpus maritimus	I (5–10)		I (6)		I (5–10)
Trifolium pratense		I (1–4)	I (1–4)		I (1–4)
Leontodon autumnalis		I (1–4)	I (1–2)		I (1–4)
Glechoma hederacea		I (1–3)		I (4)	I (1–4)
Agrostis canina		I (5)		I (4)	I (4–5)
Brachythecium mildeanum		I (4)		I (4)	I (4)
Plantago lanceolata			I (1–3)	I (1–2)	I (1–3)
Centaurea nigra			I (3–4)	I (1)	1 (1–4)
Lythrum salicaria			I (1–3)	I (3)	I (1–3)
Samolus valerandi			I (1–2)	I (1–3)	I (1–3)
Number of samples	81	57	48	33	229
Number of species/sample	12 (6–19)	14 (8–23)	16 (9–27)	17 (10–25)	14 (6–27)

a *Carex nigra* sub-community
b *Equisetum variegatum* sub-community
c *Carex flacca-Pulicaria dysenterica* sub-community
d *Holcus lanatus-Angelica sylvestris* sub-community
15 *Salix repens-Calliergon cuspidatum* dune-slack (total)