
MC8

Festuca rubra-*Armeria maritima* maritime grassland

Synonymy

Festuca rubra community McLean 1935; *Festucetum rubrae* Gillham 1953; *Armerietum* Goodman & Gillham 1954, McVean 1961; *Sileno maritimae-Festucetum pruinosa* R.Tx. 1963 p.p., *Armerieto maritimae-Daucetum gummiferi* Géhu 1964 p.p., *Festuco-Armerietum rupestris* Malloch 1971.

Constant species

Festuca rubra, *Armeria maritima*.

Rare species

Asparagus officinalis ssp. *prostratus*, *Astragalus danicus*, *Brassica oleracea*, *Carpobrotus edulis*, *Parapholis incurva*, *Scilla verna*, *Senecio integrifolius* spp. *maritimus*, *Silene nutans*, *Trifolium occidentale*.

Physiognomy

The *Festuca rubra*-*Armeria maritima* community is a grassland with a generally closed sward, usually dominated by *F. rubra* which often forms a thick mattress. *A. maritima* may be abundant as scattered bulky cushions but it is not usually a dominant species. Frequent throughout the community are *Agrostis stolonifera*, *Plantago maritima*, *Daucus carota* ssp. *gummifer* and *Silene vulgaris* ssp. *maritima*. Bryophytes are generally sparse.

Sub-communities

Typical sub-community: *Festuca rubra* community McLean 1935; Coastal *Armerietum* Goodman & Gillham 1954 p.p.; Hirta mixed grassland p.p. & Rona *Armerietum* McVean 1961; *Festuco-Armerietum rupestris*, typical sub-association Malloch 1971. In this rather species-poor sub-community, *F. rubra* is overwhelmingly dominant as a mattress which may attain a thickness of 40 cm. There are scattered cushions of *Armeria maritima* but *Agrostis stolonifera* is the only other species that is at all frequent. No species is prefe-

rential here but the prostrate maritime form of *Asparagus officinalis* is a notable rarity. Bryophytes are rarely able to find a place in the thick turf.

***Crithmum maritimum* sub-community:** Coastal *Armerietum* Goodman & Gillham 1954 p.p., *Armerieto-Daucetum gummiferi crithmetosum* Géhu 1964; *Festuco-Armerietum rupestris*, *Crithmum maritimum* sub-association Malloch 1971. *F. rubra* is again dominant as a mattress with scattered *A. maritima* cushions. *Daucus carota* ssp. *gummifer* attains constancy here though it is rarely abundant and the really distinctive feature of the vegetation is the occurrence in the more open areas of the sward of species characteristic of maritime crevices and ledges, notably *Crithmum maritimum*, *Inula crithmoides*, *Brassica oleracea* and *Beta vulgaris* ssp. *maritima*. *Brachypodium pinnatum* is a sometimes abundant preferential species. Vegetation similar to this sub-community was described by Coombe (1961) as one of the contexts for the rare *Trifolium occidentale* (see also Géhu 1973b).

***Ligusticum scoticum* sub-community.** This is a more closed sub-community than the latter with a generally intact sward of *F. rubra* with some *Agrostis stolonifera* and occasionally abundant *Holcus lanatus*. *Armeria maritima* and *Ligusticum scoticum* are both constant though usually in small amounts.

***Holcus lanatus* sub-community:** Inland *Armerietum* Goodman & Gillham 1954; *Festuco-Armerietum rupestris*, *Holcus-Dactylis* variant Malloch 1971. A thick mattress of *F. rubra* with scattered *A. maritima* is again characteristic but here there is a prominent contribution by species characteristic of inland neutral grasslands. *H. lanatus* is constant and may make a substantial contribution to the grassy cover with smaller amounts of *Dactylis glomerata* and *Agrostis stolonifera*. *Rumex acetosa*, *Hypochoeris radicata* and *Plantago lanceolata* are frequent and there are occasional records for

Achillea millefolium, *Cirsium arvense* and *C. vulgare*. *Senecio integrifolius* ssp. *maritimus* occurs in this community at its Anglesey locality (see also Smith 1979).

***Plantago coronopus* sub-community:** *Plantago coronopus*-*Cerastium tetrandum* Association Br.-Bl. & R.Tx. 1952; Grazed *Festucetum rubrae* Gillham 1953; Hirta *Plantago* sward McVean 1961; *Cerastium atrovirens*-*Plantago coronopus* Association and *Carex distans*-*Plantago maritima* Association p.p. Ivimey-Cook & Proctor 1966; *Festuco-Armerietum rupestris*, *Plantago coronopus* sub-association Malloch 1971, Habitat Group III Goldsmith 1975 p.p. Physiognomically, this sub-community presents a marked contrast to those described above. There is a short tight sward, still generally dominated by *F. rubra* with scattered *Armeria maritima* but here with constant *Agrostis stolonifera*, *Plantago coronopus* and *P. maritima*. Occasionally, the two *Plantago* spp. may dominate: *P. maritima* tends to be more prominent in the north and *P. coronopus* in the south. A number of smaller herbaceous species are preferential to this sub-community including some sedges, notably *Carex distans* and *C. caryophyllaea*, and various annuals such as *Cerastium diffusum* ssp. *diffusum* (= *C. tetrandum* = *C. atrovirens*), *Desmazeria marina*, *Sagina maritima* and *S. apetala* which may be missed in late sampling. Bryophytes, though never very abundant, are more conspicuous here than in any other sub-community with occasional records for *Eurhynchium praelongum*, *Tortella flavovirens* and *Trichostomum brachydontium*.

***Anthyllis vulneraria* sub-community.** *F. rubra* and *Anthyllis vulneraria* are co-dominant here with constant *Armeria maritima*, *Silene vulgaris* ssp. *maritima* and *Agrostis stolonifera* in what is one of the most colourful of maritime communities in the flowering season. *Holcus lanatus*, *Plantago maritima* and *Lotus corniculatus* are frequent with *Sedum anglicum* and *Sonchus oleraceus* as preferential occasionals.

***Armeria maritima*-dominated sub-community:** Coastal *Armerietum* Goodman & Gillham 1954 p.p. *F. rubra* and *A. maritima* are the sole constants in this, the most open and species-poor of the sub-communities. Cushions of *A. maritima* dominate the vegetation with *F. rubra* only rarely attaining over 10% cover. *Spergularia rupicola* is the only other frequent species and scattered plants of this and the few occasionals are rooted in patches of bare soil between exposed rock.

Habitat

Of the grasslands proper occurring on coastal cliffs, the *Festuca-Armeria* community occupies the most maritime position. It generally occurs on steep to moderate slopes up to about 50 m above sea-level and receives

large amounts of sea-spray. The community is found on a wide range of rock types and the soils are generally brown rankers, moderately deep, rich in rock fragments and organic matter (much of it derived from decay of the bulky grass mattress) and of neutral pH.

Some of the floristic variation within the community can be understood in relation to a gradient of maritime influence running from the most maritime situations with (in the south) the *Crithmum* sub-community or (in the north) the *Ligusticum* sub-community, through the typical sub-community to much less maritime situations with the *Holcus* sub-community. Often, this variation is related to a topographic zonation from low-situated steep slopes with shallow soils to high gentle slopes with deep soils but this general pattern is complicated by aspect and the particular configuration of the cliff profile. On exposed, south-facing sites in southern England, for example, high maritime influence and parching of soils may act together and here the *Crithmum* sub-community may extend high up the cliffs on to gentle slopes with quite deep soils. By contrast, on sheltered cliffs, the *Holcus* sub-community may run further downslope than in exposed situations, almost eclipsing the more maritime sub-communities.

Where site drainage becomes excessive, the dominance of *F. rubra* in these grasslands seems to suffer and both the *Anthyllis* and *Armeria* sub-communities seem to be related in part to this effect. The *Anthyllis* sub-community is generally associated with south- or west-facing slopes often with very shallow soils. The *Armeria*-dominated sub-community is especially characteristic of more maritime situations where there is some degree of erosion, as, for example, on fractured cliff edges where *A. maritima* is able to maintain its position by rooting deep into crevices.

The *Plantago coronopus* sub-community is unusual among the various types of *Festuca-Armeria* grassland in that it is grazed: normally the community is naturally inaccessible to stock or beyond the limit of cliff-top enclosure. Grazing, generally by sheep, produces and maintains the close, varied sward of the *P. coronopus* sub-community and stands may occur alongside ungrazed areas of the typical sub-community. The predominance in this sub-community of *P. coronopus* as against *P. maritima* towards the south is perhaps related to the greater ability of the former to withstand higher summer temperatures and moderately low rainfall in a maritime environment (see Dodds 1953).

Zonation and succession

On ungrazed cliffs, the *Festuca-Armeria* community generally forms a zone above the *Crithmo-Spergularietum* or the *Armeria-Ligusticum* crevice communities into which it may grade through its *Crithmum* or *Ligusticum* sub-communities. Above it may pass into the

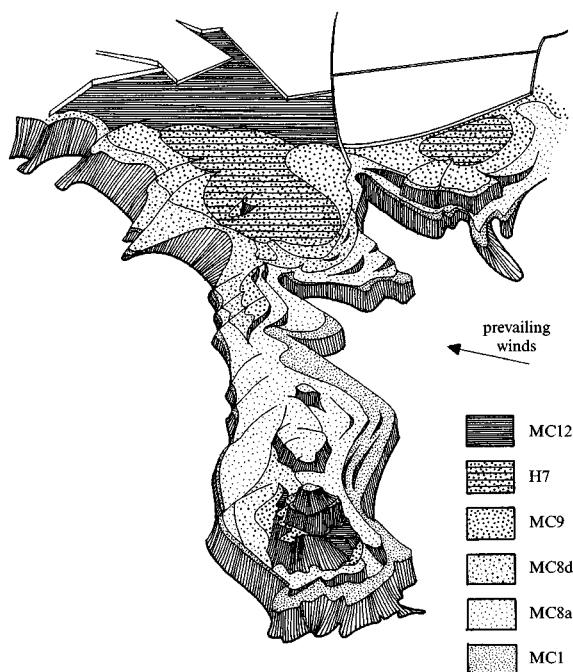
Festuca-Holcus maritime grassland through its *Holcus* sub-community (Figure 21). This is the general zonation on the cliffs of much of south-west England, Wales and southern Scotland, though on chalk and limestones there is a tendency for the *Crithmum* sub-community to pass directly into cliff-top *Festuca-Daucus* maritime grassland.

On grazed cliffs, the *Plantago coronopus* sub-community may replace all other sub-communities and pass above into the *Festuca-Plantago* maritime grassland. This zonation is characteristic of much of the cliffed coast of north-west Scotland.

Throughout its range, the *Festuca-Armeria* grassland may give way on very shallow dry soils to various types of *Armeria-Cerastium* community, particularly the *Anthyllis* sub-community.

Figure 21. Vegetation pattern at Gurnard's Head, Cornwall.

The basic zonation around Gurnard's Head is from the MC1 *Crithmo-Spergularietum* through the MC8 *Festuca-Armeria* and MC9 *Festuca-Holcus* grasslands to the MC12 *Festuca-Hyacinthoides* community or H7 *Calluna-Scilla* maritime heath. Towards the end of the headland, the proportions of these vegetation types show characteristic variation with shifts in exposure to the prevailing spray-laden winds and there are differences in the kinds of MC8 *Festuca-Armeria* grassland represented: the Typical sub-community occupies the more maritime situations, the *Holcus* sub-community the less.



Distribution

The community occurs around the whole of the cliffed coastline of Britain, though it is rather rare on the Channel coast. The *Crithmum* sub-community is restricted to the area south of the Mull of Galloway and the typical and *Holcus* sub-communities tend to be commoner in the south. The *Ligusticum* sub-community occurs only north of the Mull of Galloway and the *Plantago coronopus* sub-community is commoner in the north. The *Anthyllis* sub-community seems to be confined to south-west England and Wales.

Affinities

Maritime grasslands dominated by *F. rubra* have been described from salt-marshes and variously allocated to the *Juncetum gerardi* or the *Festucetum littoralis* Corillion 1953. The cliff grasslands of the kind included here are, however, distinct in the general absence of salt-marsh species and have been long, if vaguely, characterised in descriptive accounts as various forms of *Festucetum rubrae* or *Armerietum maritima*.

There is no exact phytosociological counterpart to the *Festuca-Armeria* grassland: both the *Sileno-Festucetum pruinosae* of Tüxen (1963) and the *Armerieto-Daucetum gummiferi* of Géhu (1964) are more broadly defined and include parts of other maritime grasslands and even some maritime forms of heath. There is, however, fairly general agreement that this kind of community belongs alongside other halophyte swards in the Glauceto-Puccinellietalia of the Asteretea and Malloch (1970, 1971) proposed a new alliance, the *Silenion maritimae*, to contain the distinctive cliff forms of this vegetation.

Various of the sub-communities of the *Festuca-Armeria* grassland represent clear floristic transitions to other maritime communities. The *Crithmum* and *Ligusticum* sub-communities form a link with the crevice vegetation of the *Crithmo-Limonietea* and the *Holcus* and *Plantago coronopus* have affinities with less maritime and grazed forms of cliff sward.

Floristic table MC8

	a	b	c	d	e	f	g	8
<i>Festuca rubra</i>	V (7–10)	V (2–10)	V (4–10)	V (5–10)	V (3–10)	V (2–10)	V (2–5)	V (2–10)
<i>Armeria maritima</i>	V (1–5)	IV (1–5)	V (2–7)	V (1–8)	V (2–10)	V (2–5)	V (4–10)	V (1–10)
<i>Agrostis stolonifera</i>	III (1–5)	I (1–5)	IV (2–5)	III (1–5)	IV (1–7)	IV (2–5)	II (4)	III (1–7)
<i>Crithmum maritimum</i>		V (1–8)		I (2–3)	I (4)	I (3)		I (1–8)
<i>Daucus carota gummifer</i>	II (1–5)	IV (1–5)	I (1)	III (1–5)	I (1–5)	II (1–5)	I (2)	II (1–5)
<i>Inula crithmoides</i>		II (1–3)			I (2–3)			I (1–3)
<i>Beta vulgaris maritima</i>	I (1–4)	II (1–6)		I (1)	I (3)			I (1–6)
<i>Brassica oleracea</i>		II (1–5)						I (1–5)
<i>Brachypodium pinnatum</i>		I (4–5)		I (4)				I (4–5)
<i>Ligusticum scoticum</i>			V (3–5)	I (2)	I (3–4)			I (2–5)
<i>Holcus lanatus</i>	I (1–3)	I (3)	III (2–8)	V (1–8)	I (1–5)	III (2–4)	II (1–4)	II (1–8)
<i>Rumex acetosa</i>	I (1–3)	I (2)	I (1–4)	III (1–5)	I (1–4)	I (2)	II (3–5)	I (1–5)
<i>Achillea millefolium</i>				I (2–3)		I (1–3)		I (1–3)
<i>Cirsium arvense</i>	I (1)			I (1–3)				I (1–3)
<i>Plantago coronopus</i>	I (1–4)	II (2–5)	I (2)	I (2–3)	V (1–8)	II (1–3)	II (1–4)	II (1–8)
<i>Plantago maritima</i>	II (1–7)	I (1–4)	III (3–5)	I (1–5)	IV (1–10)	III (3–5)	I (4)	III (1–10)
<i>Cerastium diffusum diffusum</i>	I (1)				II (1–5)		I (2)	I (1–5)
<i>Carex distans</i>		I (2)		I (1)	I (1–4)			I (1–4)
<i>Carex caryophylla</i>					I (1–4)			I (1–4)
<i>Desmazeria marina</i>		I (1–4)			I (2–3)	I (1)		I (1–4)
<i>Centaurium erythraea</i>				I (1)	I (1–3)	I (1–2)		I (1–3)
<i>Sagina maritima</i>					I (2–5)			I (2–5)
<i>Sagina apetala</i>					I (1–5)			I (1–5)
<i>Tortella flavovirens</i>	I (3)	I (3)			I (1–5)		I (2)	I (1–5)
<i>Trichostomum brachydontium</i>		I (1)			I (2–4)			I (1–4)
<i>Eurhynchium praelongum</i>	I (2)				I (3–5)			I (2–5)
<i>Anthyllis vulneraria</i>	I (1–5)	II (1–5)		I (1–4)	I (1–4)	V (4–10)		I (1–10)
<i>Silene vulgaris maritima</i>	II (1–5)	I (2–5)	II (3–4)	II (1–6)	I (2–6)	V (2–4)	II (1–4)	I (1–6)
<i>Sedum anglicum</i>		I (2)			I (1–4)	II (2–3)		I (1–4)

Floristic table MC8 (cont.)

	a	b	c	d	e	f	g	8
<i>Sonchus oleraceus</i>	I (1–3)	I (1–3)		I (1–2)	I (1–2)	II (1–3)		I (1–3)
<i>Lotus corniculatus</i>	II (1–4)	II (1–4)	II (2–4)	III (1–5)	II (2–6)	III (1–4)		II (1–6)
<i>Trifolium repens</i>	I (2–4)	I (2–3)	II (2–4)	II (2–5)	II (2–5)	I (2–3)	II (3–4)	II (2–5)
<i>Cochlearia officinalis</i>	II (1–4)		II (1–3)	I (1–3)	II (1–4)	II (1–3)	I (1–2)	II (1–4)
<i>Matricaria maritima</i>	I (1–2)	I (1–3)	II (2–4)	I (1–2)	I (1–2)	I (2)	I (2)	I (1–4)
<i>Plantago lanceolata</i>	I (1–3)	I (2–3)	I (4)	II (1–4)	I (2)	II (1–3)		I (1–4)
<i>Spergularia rupicola</i>	I (1–2)	I (1–2)		I (2–3)	I (1–4)	I (2–3)	III (3–4)	I (1–4)
<i>Cerastium fontanum</i>	I (1–3)		I (3)	I (1–3)	II (1–3)	I (1–3)		I (1–3)
<i>Hypochoeris radicata</i>	I (1–3)	I (1–3)		II (1–4)	I (1–3)	II (2–3)		I (1–4)
<i>Scilla verna</i>	I (1–3)		I (2–3)	II (1–6)	I (2–6)	II (2–3)		I (1–6)
<i>Dactylis glomerata</i>	I (1–3)	II (2–4)	I (2)	II (1–7)	I (2)			I (1–7)
<i>Leontodon autumnalis</i>	I (2–4)		II (2–3)	I (2–3)	II (1–4)			I (1–4)
<i>Poa subcaerulea</i>	I (3–5)		I (3–4)	I (1–7)	I (3–8)			I (1–8)
<i>Cochlearia danica</i>	I (1)	I (1–3)			I (1–4)		II (1–4)	I (1–4)
<i>Angelica sylvestris</i>	I (4)		II (2–5)	I (1–4)				I (1–5)
<i>Leontodon taraxacoides</i>	I (1–3)			I (1–3)	I (1–4)	I (1–2)		I (1–4)
<i>Potentilla erecta</i>				I (2–4)		I (1–2)		I (1–4)
Number of samples	120	51	16	100	160	18	12	477
Number of species/sample	6 (2–10)	8 (3–15)	8 (4–11)	9 (4–14)	9 (4–16)	10 (5–13)	5 (3–7)	8 (2–15)
Vegetation height (cm)	16 (5–40)	15 (3–50)	15 (5–30)	17 (5–40)	4 (1–15)	14 (7–26)	7 (3–20)	11 (3–50)
Total vegetation cover (%)	99 (60–100)	83 (10–100)	96 (80–100)	100 (95–100)	95 (20–100)	98 (80–100)	75 (5–100)	95 (5–100)
Altitude (m)	21 (4–55)	17 (4–47)	26 (3–57)	35 (8–210)	23 (2–150)	21 (6–55)	55 (10–150)	25 (2–210)
Slope (°)	14 (0–50)	28 (0–90)	27 (5–70)	18 (0–15)	9 (0–40)	26 (0–28)	7 (0–23)	23 (0–90)
Soil depth (cm)	27 (4–80)	22 (4–48)	31 (8–70)	34 (3–75)	23 (2–75)	19 (3–58)	16 (8–45)	26 (2–80)
Number of soil samples	29	15	3	28	63	3	no data	78
Superficial pH	6.5 ±0.2	7.5 ±0.2	5.5	5.7 ±0.2	6.3 ±0.1	5.9		6.3 ±0.1
Water content (% soil dry weight)	93 ±11	45 ±7	132	81 ±11	100 ±12	60		89 ±6
Loss on ignition (% soil dry weight)	24 ±2	12 ±2	43	26 ±3	28 ±3	16		25 ±2

Sodium (mole g ⁻¹)	104 ±15	58 ±8	132	51 ±5	92 ±11	29	82 ±6
Potassium (mole g ⁻¹)	13 ±1	13 ±1	15	12 ±1	12 ±1	9	12 ±1
Magnesium (mole g ⁻¹)	66 ±7	57 ±1	47	44 ±4	59 ±5	35	57 ±3
Calcium (mole g ⁻¹)	49 ±8	73 ±10	49	40 ±9	42 ±4	17	46 ±3
Phosphorus (mole g ⁻¹)	2.0 ±0.4	0.4 ±0.1	2.3	2.8 ±0.9	1.9 ±0.4	0.8	1.9 ±0.3
Sodium/loss on ignition (mole g ⁻¹)	469 ±58	569 ±91	336	220 ±27	336 ±21	179	363 ±21

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- a Typical sub-community
 - b *Crithmum maritimum* sub-community
 - c *Ligusticum scoticum* sub-community
 - d *Holcus lanatus* sub-community
 - e *Plantago coronopus* sub-community
 - f *Anthyllis vulneraria* sub-community
 - g *Armeria maritima*-dominated sub-community
 - 8 *Festuca rubra*-*Armeria maritima* maritime grassland (total)

