MC10
Festuca rubra-Plantago spp. maritime grassland

Synonymy
Plantago sward Praeger 1911, Tansley, 1939, Asprey 1946, Poore & Robertson 1949, McVean 1961 *p.p.*; *Plantaginetum coronopi* Gillham 1953 *p.p.*; *Plantago maritima* nodum Malloch 1971; Habitat Group IV Goldsmith 1975 *p.p.*

Constant species
Festuca rubra, *Plantago coronopus*, *P. lanceolata*, *P. maritima*, *Agrostis stolonifera*.

Rare species
Astragalus danicus, *Oxytropis halleri*, *Primula scotica*, *Scilla verna*, *Trifolium occidentale*.

Physiognomy
The *Festuca-Plantago* maritime grassland has a closed, very short and tight sward which is generally dominated by *F. rubra* and *Plantago* spp., especially *P. maritima*, with some *Agrostis stolonifera* and a variety of diminutive herbaceous associates of which *Euphrasia* spp. (usually grazed beyond recognition to the species), *Lotus corniculatus*, *Leontodon autumnalis*, *Cerastium fontanum* and *Scilla verna* are the most frequent throughout. Bryophytes make a small contribution to the sward with occasional records for *Hypnum cupressiforme* and *Mnium hornum*.

Sub-communities

***Armeria maritima* sub-community:** *Plantago* sward *auct. angl. p.p. A. maritima* is an additional constant in the rather species-poor sward of this sub-community, though it is only rarely abundant. *Holcus lanatus*, *Cochlearia officinalis*, *Poa subcaerulea* (especially in the north), *Silene vulgaris* ssp. *maritima*, *Leontodon taraxacoides* and *Cerastium diffusum* ssp. *diffusum* are preferential or differential at low frequency. *Oxytropis halleri*, *Primula scotica* and *Trifolium occidentale* occur occasionally within their ranges of distribution.

***Carex panicea* sub-community.** *Euphrasia* spp., *Lotus corniculatus* and *Leontodon autumnalis* attain constancy in this more species-rich and rather variable sward but the really distinctive feature is the constancy and occasional abundance of *Carex panicea*. *Thymus praecox* is preferentially frequent here and there are occasional records for a variety of poor-fen species such as *Carex demissa*, *C. serotina*, *C. nigra*, *Anagallis tenella*, *Molinia caerulea* and *Ranunculus flammula*, though the dominance of *F. rubra* and *P. maritima* remains characteristic. Rare species which occur occasionally are *Festuca vivipara* (indistinguishable from *F. ovina* when heavily-grazed), *Polygonum viviparum*, *Thalictrum alpinum*, *Trollius europaeus* and *Coeloglossum viride*. *Primula scotica* is not as frequent here as in the *Armeria* sub-community. *Salix repens*, *Nardus stricta* and *Calluna vulgaris* are differential at low frequencies.

***Schoenus nigricans* sub-community.** *Carex panicea* and *Euphrasia* spp. are as frequent here as in the *C. panicea* sub-community but additional constants are *Schoenus nigricans*, *Carex serotina*, *Danthonia decumbens*, *Potentilla erecta* and *Molinia caerulea*. *Festuca rubra* is much less abundant in this sub-community and *Plantago maritima* or *S. nigricans* (as its prostrate maritime ecotype) generally dominate. Wet heath and poor-fen species which are occasional in the *C. panicea* sub-community are more frequent here: *Ranunculus flammula*, *Erica tetralix*, *Anagallis tenella*, *Hydrocotyle vulgaris* and *Succisa pratensis*. *Polygala serpyllifolia* is differential at low frequency.

Habitat
The *Festuca-Plantago* community is one of the sea-cliff grasslands characteristic of less maritime situations. A sub-set of soil samples had a mean sodium/loss on ignition ratio between the mean values for the *Festuca-Armeria* and *Festuca-Holcus* communities. The most obvious environmental characteristic separating the *Festuca-Plantago* community from these other maritime

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grasslands is that it is consistently and heavily grazed, generally by sheep, which maintain the short sward as an often very extensive community of gently-sloping cliff tops.

The floristic differences between the sub-communities can be related mainly to soil variation, though the *Armeria* sub-community also tends to be characteristic of more maritime situations. Under this sub-community, which occurs on generally steeper slopes, the more shallow soils are predominantly mineral, usually brown rankers with a neutral to slightly acid pH. The *C. panicea* sub-community is found in less maritime situations but also usually in regions of wetter climate. Under such conditions, the deeper soils on more gentle slopes are damper and less well drained and often develop a superficial peaty layer (partly derived from the decay of *P. maritima*) over a gleyed mineral horizon. The *Schoenus* sub-community is characteristic of even wetter conditions and its small stands typically occur in depressions or gently-sloping valleys on cliffs where flushing maintains a slow water-flow through deep organic soils.

Zonation and succession

This maritime grassland generally occurs as a zone on grazed sea-cliffs above the *Festuca-Armeria* community (into which it may grade through the *Armeria* sub-community) and at roughly the same level as the *Festuca-Holcus* community. As such, it forms part of the sequence of cliff grasslands developed in relation to decreasing maritime influence on moving inland. Above it usually passes to maritime forms of heath or acid grassland.

It may also form zonations with the *Festuca-Armeria* and *Festuca-Holcus* grasslands in response to variations in grazing pressure and with increased inaccessibility to stock it can grade to these communities through their sub-association of *Plantago* spp. (Figure 23).

The zonation of the various sub-communities reflects the influence of both salt-spray deposition and soil patterns. The *Armeria* sub-community usually forms a zone seaward of the *C. panicea* sub-community and the *Schoenus* sub-community occurs patchily within the latter where there is pronounced flushing.

Grazing probably mediates a successional relationship between the *Festuca-Plantago* community and both the *Festuca-Armeria* and *Festuca-Holcus* communities, particularly the latter. It is possible that the *C. panicea* sub-community develops from wet maritime heath where this is heavily grazed.

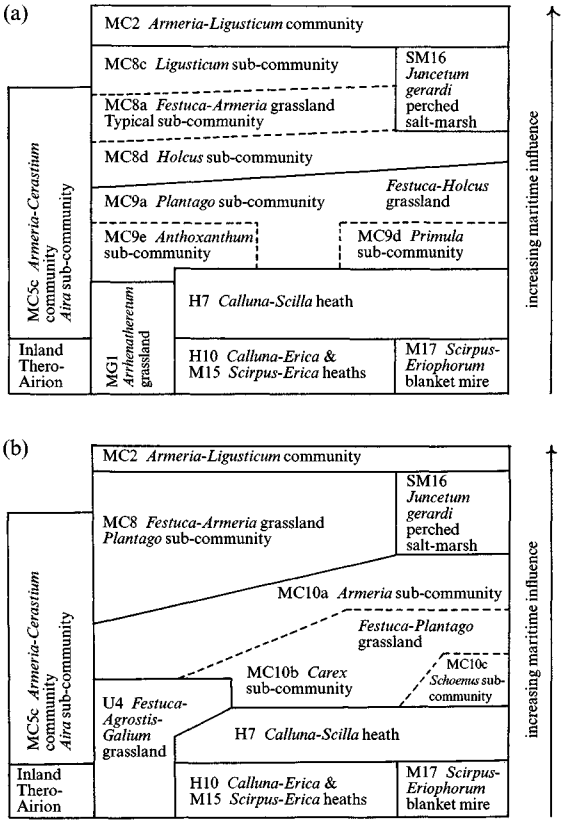
Distribution

The *Festuca-Plantago* maritime grassland is predominantly a northern community reaching its most pronounced development on the cliffs of north-west Scotland, the Hebrides, Orkney and Shetland where heavy sheep-grazing occurs in a region of high rainfall. The *C. panicea* sub-community occurs widely as far south as Galloway but the *Schoenus* sub-community is much more restricted: it has been encountered only on Islay, Skye, Harris, Lewis and the Ardnamurchan peninsula. The *Armeria* sub-community is widely distributed in Scotland but it also occurs patchily in Wales and south-west England.

Affinities

This community includes much of the very distinctive cliff-top vegetation described as *Plantago* sward by numerous authors from Britain (Tansley 1939, Asprey 1946, Poore & Robertson 1949, McVean 1961) and Ireland (Praeger 1911, 1934). It has no existing phytosociological counterpart but can be seen as the grazed equivalent of the *Festuca-Holcus* community (and perhaps also partly the *Festuca-Armeria* community). As such, it could be accommodated among the cliff grasslands of the Asteretea which Malloch (1970, 1971) placed in the new alliance Silenion maritimae.

Figure 23. Zonations showing the impact of grazing on sea-cliff vegetation in north-west Britain.
The upper diagram (a) shows typical patterns on an ungrazed sea-cliff on acidic bedrocks in north-west Britain with (b) the kinds of changes that can be seen where such a cliff is grazed.



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The *C. panicea* sub-community and particularly the *Schoenus* sub-community can be seen as part of a floristic transition from maritime grassland to wet heath. *S. nigricans* occurs in a variety of maritime and sub-maritime vegetation types of salt-marshes and sand-dunes (Sparling 1968) but here the maintenance of high frequencies of *F. rubra* and *Plantago* spp., as well as the absence of a prominent bryophyte component with such species as *Campylium stellatum* and *Scorpidium scorpioides*, argue for retaining the vegetation within this maritime grassland rather than considering it as a maritime variant of *Schoenetum nigricantis*.

Floristic table MC10

	a	b	c	10
Festuca rubra	V (3–10)	V (2–8)	V (3–5)	V (2–10)
Plantago coronopus	V (1–7)	V (2–7)	V (2–5)	V (1–7)
Plantago lanceolata	V (1–6)	V (1–5)	V (3–4)	V (1–6)
Plantago maritima	V (2–10)	V (3–10)	V (2–8)	V (2–10)
Agrostis stolonifera	IV (2–7)	IV (2–5)	IV (2–5)	IV (2–7)
Armeria maritima	V (1–8)	II (2–5)	I (2–4)	III (1–8)
Holcus lanatus	II (2–6)			I (2–6)
Cochlearia officinalis	II (1–4)	I (2–3)		I (1–4)
Poa subcaerulea	II (2–8)	I (2–6)		I (2–8)
Silene vulgaris maritima	I (2–5)			I (2–5)
Leontodon taraxacoides	I (1–4)			I (1–4)
Cerastium diffusum diffusum	I (1–3)			I (1–3)
Carex panicea		IV (1–7)	V (3–5)	II (1–7)
Euphrasia spp.	III (1–4)	IV (1–4)	IV (2–3)	III (1–4)
Lotus corniculatus	II (1–7)	IV (1–5)	I (1–3)	II (1–7)
Leontodon autumnalis	II (1–5)	IV (1–5)	III (2–3)	II (1–5)
Thymus praecox	I (2–6)	III (1–5)	I (3)	II (1–6)
Aira praecox	I (1–5)	II (1–3)		I (1–5)
Anthoxanthum odoratum	I (2–4)	II (1–6)		I (1–6)
Bellis perennis	I (2–4)	II (1–4)		I (1–4)
Luzula campestris	I (1–3)	II (1–4)	I (1)	I (1–4)
Ranunculus acris	I (1–8)	II (1–3)	I (2)	I (1–8)
Sagina procumbens	I (2–3)	II (2–3)	I (2)	I (2–3)
Viola riviniana		II (1–3)	I (1–3)	I (1–3)
Salix repens		I (1–8)		I (1–8)
Nardus stricta		I (2–6)		I (2–6)
Calluna vulgaris		I (1–4)		I (1–4)
Schoenus nigricans		I (1)	V (2–8)	I (1–8)
Carex serotina	I (2–4)	I (2–4)	V (2–4)	I (2–4)
Danthonia decumbens	I (2–3)	II (2–5)	V (2–4)	I (2–5)
Potentilla erecta	I (2–3)	II (1–4)	V (2–3)	I (1–4)
Molinia caerulea		I (2–8)	IV (2–9)	I (2–9)
Ranunculus flammula		I (1–3)	III (1–3)	I (1–3)
Polygala serpyllifolia			II (1–2)	I (1–2)
Anagallis tenella	I (3)	I (2–3)	II (2–4)	I (2–4)
Erica tetralix	I (3)	I (4)	II (2–5)	I (2–5)
Hydrocotyle vulgaris	I (3)	I (1)	II (2–3)	I (1–3)
Succisa pratensis	I (1)	I (1–6)	II (2–3)	I (1–6)
Pinguicula vulgaris			I (1)	I (1)

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Cerastium fontanum	III (1–4)	III (1–3)	II (2)	III (1–4)
Scilla verna	III (1–4)	III (1–4)	III (2–3)	III (1–4)
Carex nigra	I (2–4)	II (2–5)	II (3)	I (2–5)
Prunella vulgaris	I (1–2)	II (1–4)	III (1–3)	I (1–4)
Trifolium repens	II (1–5)	III (2–4)	I (3)	II (1–5)
Silene acaulis	I (2–7)	I (4–5)	I (3)	I (2–7)
Agrostis capillaris	I (2–5)	I (3–5)	I (4)	I (2–5)
Parnassia palustris	I (2)	I (3)	I (3)	I (2–3)
Sedum anglicum	I (1–4)	I (2–3)		I (1–4)
Sagina apetala	I (1–3)	I (1–3)		I (1–3)
Koeleria macrantha	I (2–5)	I (2–5)		I (2–5)
Hypochoeris radicata	I (1–4)	I (1)		I (1–4)
Hypnum cupressiforme	I (2–4)	I (2–5)		I (2–5)
Daucus carota gummifer	I (1–5)	I (2–3)		I (1–5)
Anthyllis vulneraria	I (1–5)	I (1–6)		I (1–6)
Rumex acetosa	I (1–3)	I (2–4)		I (1–4)
Mnium hornum	I (2–3)	I (2–4)		I (2–4)
Festuca ovina	I (5)	I (3–6)		I (3–6)
Empetrum nigrum	I (2–4)	I (1–8)		I (1–8)
Selaginella selaginoides		I (2–3)	I (2–3)	I (2–3)
Gentianella campestris		I (1–3)	I (1–2)	I (1–3)
Angelica sylvestris		I (1–3)	I (1)	I (1–3)
Linum catharticum		I (2–3)	I (3)	I (2–3)
Juncus acutiflorus		I (2–4)	I (3)	I (2–4)
Dactylorchis majalis purpurella		I (3)	I (1)	I (1–3)
Number of samples	138	113	11	262
Number of species/sample	12 (8–17)	17 (9–26)	17 (11–23)	14 (8–26)
Vegetation height (cm)	4 (1–15)	4 (1–15)	5 (2–19)	4 (1–19)
Total vegetation cover (%)	99 (80–100)	99 (80–100)	99 (90–100)	99 (80–100)
Altitude (m)	22 (2–100)	24 (4–80)	28 (15–45)	23 (2–100)
Slope (°)	11 (0–39)	8 (0–35)	6 (0–15)	10 (0–39)
Soil depth (cm)	25 (5–81)	32 (5–75)	35 (21–57)	28 (5–81)
Number of soil samples	48	38	3	89
Superficial pH	5.5 ±0.1	5.5 ±0.1	5.5	5.5 ±0.1
Water content (% soil dry weight)	94 ±13	139 ±21	261	119 ±12
Loss on ignition (% soil dry weight)	28 ±3	35 ±4	57	32 ±2
Sodium (mole g^{-1})	77 ±10	67 ±8	127	74 ±7
Potassium (mole g^{-1})	13 ±1	12 ±1	16	13 ±1
Magnesium (mole g^{-1})	56 ±5	43 ±4	66	51 ±4
Calcium (mole g^{-1})	28 ±3	26 ±3	32	27 ±2
Phosphorus (mole g^{-1})	1.6 ±0.3	1.2 ±0.3	0.9	1.4 ±0.2
Sodium/loss on ignition (mole g^{-1})	279 ±23	207 ±12	222	246 ±14

a *Armeria maritima* sub-community
b *Carex panicea* sub-community
c *Schoenus nigricans* sub-community
10 *Festuca-Plantago* spp. maritime grassland (total)

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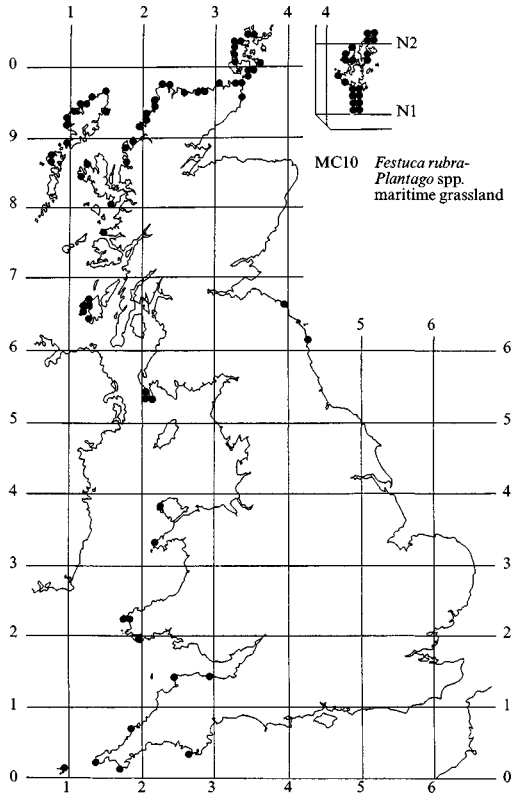

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