

The Axiophytes and Habitats in Caithness

by

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Version 1.1

The Axiophytes and Habitats of Caithness-

(a botanical study)

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This is an account of the more important wild plants in the county of Caithness in the North of Scotland. The full range of habitats in the county is classified and the particularly important and characteristic plants of each habitat is listed.

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Cover photograph: *Carex recta* in the Wick River in saline community D6

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The Axiophytes of Caithness

Introduction

Axiophytes are “worthy plants”: that is, they are the 40% or so of species that draw the attention of a botanist because they are indicators of a “worthy” habitat, or of a rich biodiversity. Lists of axiophytes provide a powerful method for assessing the biodiversity value of a habitat’s plant population. Sites with many axiophytes are often (but not always) of greater importance than those with fewer. Modern methods of survey and data management make it increasingly practical to use such methods for conservation and assessment of habitat condition. This document is intended to support such purposes. 243 of the species in Caithness have been selected as axiophytes and they are listed in Annexe 1.

We have here adopted the BSBI guidance that axiophytes are those species which are 90% restricted to habitats of conservation importance. Also they should be uncommon in the less valued habitats, though it has been difficult to be more specific because Caithness has large areas of its valued habitats and thus otherwise scarce or unusual plants are frequently observed in the county.

The axiophyte lists in this document have been chosen purely through the knowledge and experience of the author in observing and surveying the county’s habitats. Any shortcomings and omissions are entirely his responsibility. It has been difficult to draw on the experience of others elsewhere because, although numerous axiophyte studies have been published, the places they cover are sufficiently different from Caithness habitats. Axiophyte listing is also a new subject, so many published studies are also first attempts. Nevertheless the perusal of other people’s lists has been a useful trigger to consider inclusion of a species in these lists.

The area covered by this analysis is the Watsonian vice – county 109 which does corresponds exactly to the commonly accepted and long established boundary of the county of Caithness including the Isle of Stroma (JE Dandy 1969).

Habitats

An axiophyte list is about the linkage between a plant species and a habitat. One aims to prepare a list for each habitat in the county, not just for the fewer habitats that are currently considered “worthy”. It is therefore imperative that the study begins by listing all the habitats and choosing the degree of detail or discrimination in splitting up the county into habitats.

Walker, K.J. et al. (2010) have discussed in detail the best modern approach to habitat classification and have recommended to the JNCC that the European classification EUNIS be adopted for habitat surveying in the UK. Although it is not certain (in March 2013) that this recommendation will be accepted, the EUNIS classification has been adopted in this study. The relevant parts of the classification, taken 2 levels down, is shown in Table 1 and the interpretation of each habitat is given in the relevant section of the text. The interpretation is based on the guidance document by Davies et.al. 2004.

Because of its more general usefulness the habitat catalogue used here has been published separately (Butler 2013).

Table 1 European Habitat Classification Applied to Caithness land surface	Notes
A – Marine habitats	
A1 - Littoral rock & other hard substrata	
A2 – Littoral sediment	
A3 – Infra-littoral rock	
B – Coastal habitats	
B1 – Coastal dunes & sandy shores	
B2 – Coastal shingle	
B3 – Rock cliffs, ledges and shores	
C – Inland Surface Waters	
C1 – Surface standing waters	
C2 – Surface running waters	
C3 – Littoral zone of inland surface waters	
D – Mires, Bogs & Fens	
D1 – Raised and Blanket bogs	
D2 – Valley mires, poor fens & transition mires	
D4 – Base-rich fens & calcareous spring mires	
D5 – Sedge & reedbeds (no free water)	
D6 – Inland brackish marshes	
E – Grasslands and others	
E1 – Dry grasslands	
E2 – Mesic grasslands	
E3 – Wet grasslands (not waterlogged)	
E4 – Alpine & subalpine grassland	
E5 – Woodland fringes & clearings	
F – Heathland and scrub	
F3 – Temperate scrub (not ericoid)[incl. gorse]	
F4 – Temperate scrub (ericoid)	
F9 – Riverine & fen scrub	
FA – Hedgerows	
FB – Shrub plantation	
G – Woodland and others	
G1 – Broadleaved deciduous woodland	
G3 – Coniferous woodland	
G4 – Mixed Broadleaved & Coniferous woods	
G5 – Lines of trees etc.	
H – Inland unvegetated habitats	
H2 – Scree	
H3 – Inland cliffs, outcrops & rock pavement	
H5 – Miscellaneous inland bare habitats	

I Regularly or recently cultivated habitats	
I1 – Arable land	
I2 – Cultivated areas of parks & gardens	
J Constructed, industrial & other land	
J1 – Buildings of town & village	
J2 – Low density buildings	
J3 – Extractive industrial sites	
J4 – Transport networks & hard surface areas	
J5 – Artificial waters & associated structures	
J6 – Waste deposits	

Axiophytes of the Marine Littoral Rock Habitat A1

Interpretation of the habitat: The seashore usually consisting of wave-washed Old Red Sandstone pavement which is usually cracked and stepped. Also includes large rock pieces lying on the shore. Small rock pieces are Coastal Shingle Habitat B2.

Axiophytes:

Armeria maritima
Puccinellia distans ssp. *borealis*.
Juncus ranarius

Axiophytes of the Marine Littoral Sediment Habitat A2

Interpretation of the habitat: Sandy and muddy tidal shores including lower part of beaches (up to the driftline) and the seaward shoreline part river estuaries. It does not include the driftline or above the driftline, both of which belong to habitat B1

Axiophytes:

There are no axiophytes for this habitat.

Axiophytes of the Marine Infra-littoral Rock Habitat A3

Interpretation of the habitat: rocky shore above the tidal strand-line and below any agricultural fencing or roadside structures. Thus it is a zone of dry or wet rock exposed to strong influences of sea spray and wind from the sea. It is also influenced by emerging groundwater from the rock face.

Axiophytes:

Asplenium marinum
Aster tripolium
Juniperus communis ssp. *nana*
Ranunculus flammula ssp. *minimus*
Sagina maritima
Sedum rosea
Tripleurospermum maritimum
Euphrasia foulaensis

Coastal Dunes and Sandy Shores Habitat B1

Interpretation of the habitat: Generally at the head of a bay where tide and wave action is quiet so that a supply of beach sand is available to be wind-blown into dunes and dune links or other sandy grassland. The habitat is often close to machair (habitat B1.9 which is defined as windblown sand over peat) or alternatively close to stable coastal dune grassland (habitat B1.4) where the substrate

is not peat. This is a major habitat in Caithness and worthy of subdivision into three parts –beaches above the driftline - sand dunes – machair/dune links.

Axiophytes of the Coastal Dunes and Sandy Shores (Sandy beaches at and above the driftline) Habitats B1.1 and 1.2

Interpretation of habitat: Sandy beach at and above the driftline up to the point of dense grassy cover or agricultural fence (or other change such as a rock outcrop).

Axiophytes:

Atriplex glabriuscula
Atriplex laciniata
Atriplex hastata
Atriplex x taschereau
Euphrasia foulaensis
Festuca rubra ssp juncea
Honkenya peploides
Mertensia maritima
Rumex crispus ssp littoreus
Spergularia media
Glaux maritima
Juncus gerardii
Blysmus rufus
Tripleurospermum maritimum
Cackile maritima

Axiophytes of the Coastal Dunes and Sandy Shores (Shifting Coastal Dunes) Habitat B1.3

Interpretation of habitat: dunes with sparse grass cover except marram, with unstable steep slopes and bare sand areas.

Axiophytes:

Ammophila arenaria
Catabrosa aquatica var uniflora
Leymus arenarius
Thalictrum minus
Erodium cicutarium ssp. dunense
Juncus gerardii
Blysmus rufus
Tripleurospermum maritimum
Cackile maritima
Carex arenaria

Axiophytes of the Coastal Dunes and Sandy Shores (Machair / Coastal stable dune grassland) Habitats B1.4 and 1.9.

Interpretation of habitat: Level ground behind dunes or behind lower beach features which has a vegetation of low herbs and a soil dominated by wind-blown sand . It may or may not have a substrate of peat.

Axiophytes:

Antennaria dioica
Anthyllis vulneraria
Armeria maritima
Botrychium lunaria
Campanula rotundifolia
Carex arenaria
Carex capillaris
Carex maritima
Coeloglossum viride
Dactylorhiza incarnata
Dactylorhiza purpurella
Equisetum variegatum
Euphrasia reayensis
Galium verum
Gentianella amarella
Gentianella campestris
Juncus balticus
Koeleria macrantha
Neottia ovata
Parnassia palustris
Pilosella officinarum
Primula veris
Primula x polyantha
Pyrola minor
Selaginella selaginoides
Valerianella locusta

Axiophytes of the Coastal Shingle Habitat B2

Interpretation of habitat: Shingle involves stones small enough to be moved by waves of typical scale not just by unusual storms. In shingle they are the dominant substrate of the shore. A shore dominated by larger stones which move rarely is a Littoral Rock habitat A1.

Axiophytes:

Honkenya peploides
Atriplex glabriuscula
Mertensia maritima

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Axiophytes of the Rock Cliffs, Ledges and Shores Habitat B3

Interpretation of habitat: The area above the driftline up to the point where it is no longer strongly influenced by sea spray . The shore can be a rock cliff largely bare of vegetation, a clay till cliff usually well vegetated, a tall herb grassland or a low herb grassy vegetation.

Axiophytes:

Sagina maritima
Sedum rosea
Ligusticum scoticum
Primula scotica
Aster tripolium
Juniperus communis ssp nana
Ranunculus flammula ssp minimus
Silene uniflora
Tripleurospermum maritimum
Plantago coronopus
Mertensia maritima
Ophioglossum vulgatum
Ophioglossum lusitanicum
Equisetum telmateia

Axiophytes of the Surface Standing Waters Habitat C1

Interpretation of habitat: Lochs, ponds, pools and dubh lochs. The water is permanent or only dries out for a short period. The surface is still or wind-blown into waves but it is not running water in which the flow is a significant factor in the habitat. Typically a loch or large pond can have small burns feeding in and a spillway feeding out without disturbing the overall stillness of the habitat. It does not include the marginal plants area which is part of Habitat C3.

Axiophytes:

Apium inundatum
Eleocharis multicaulis
Isoetes lacustris
Isoetes echinospora
Juncus bulbosus
Lemna trisulca
Littorella uniflora
Lobelia dortmanna
Menyanthes trifoliata
Nymphaea alba
Persicaria amphibia
Phragmites australis
Potamogeton alpinus
Potamogeton crispus
Potamogeton filiformis
Potamogeton friesii
Potamogeton gramineus
Potamogeton natans
Potamogeton perfoliatus
Potamogeton x nitens

Sparganium angustifolium
Sparganium emersum
Sparganium erectum
Glyceria fluitans
Myriophyllum spicatum

Axiophytes of the Surface Running Waters Habitat C2

Interpretation of habitat: Rivers, burns, springs with perceptible flow.

Axiophytes:

Equisetum fluviatile
Myriophyllum alterniflorum
Myriophyllum spicatum
Potamogeton alpinus
Potamogeton gramineus
Potamogeton berchtoldii
Schoenoplectus tabernaemontani
Eleogiton fluitans
Sparganium erectum
Sparganium emersum
Ranunculus hederaceus
Ranunculus trichophyllus

Axiophytes of the Littoral Zone of Inland Water Bodies Habitat C3

Interpretation of habitat: Shore lines of lochs, river banks, margins of ponds, beds of seasonally dry pools. Note that extensive (more than 10m wide) reed beds or fens or marshes are best consigned to habitat D5, while shallow pools less than 10m wide qualify for this habitat, C3.

Axiophytes:

Callitriche stagnalis
Carex acutiformis
Carex aquatilis
Carex recta
Carex x grantii
Carex rostrata
Catabrosa aquatica
Eleogiton fluitans
Geum x intermedium
Glyceria fluitans
Hippuris vulgaris
Lotus pedunculatus
Osmunda regalis
Myosotis laxa
Myosotis scorpioides

Myosotis secunda
Hierochloa odorata
Polygonum amphibium
Ranunculus trichophyllus

Axiophytes of the Raised and Blanket Bogs Habitat D1

Interpretation of the habitat: Bogs for which the source of water is predominantly rainwater directly and the rainwater is retained in the bog due to poor drainage, a hollow in the impermeable rock substrate or similar reason. It excludes bogs caused by springs or run-off from other ground. Pools and dubhlochs greater than 10m across the narrowest part count as open water C1.

Axiophytes:

Carex limosa
Carex pauciflora
Dactylorhiza incarnata ssp pulchella
Deschampsia setacea
Drosera intermedia
Drosera x obovata
Dryopteris carthusiana
Eleocharis multicaulis
Eriophorum latifolium
Hammarbya paludosa
Pedicularis palustris
Rhynchospora alba
Sparganium angustifolium
Vaccinium microcarpum

Axiophytes of the Valley Mires, Poor Fens and Transition Mires Habitats D2

Interpretation of the habitat: These are habitats where peat is formed at the water surface and spreads out across the water. Valley mires are contained by the local rock formation and fed by the water in transit through the valley plus local ground water. Poor fens are acid flushes on slopes fed by local springs and flushes with a vegetation of sphagnum and small sedges. Transition mires are rafts of floating peat which are more extensive than just at a loch margin.

Axiophytes:

Menyanthes trifoliata
Carex limosa
Carex lasiocarpa
Potentilla palustris
Rhynchospora alba
Carex echinata
Carex pulicaria
Viola palustris

Axiophytes of the Base-rich Fens and Calcareous Spring Mires Habitat D4

Interpretation of the habitat: Base-rich fens are usually on a shallow basin in the Old Red sandstone fed by the base-rich groundwater passing through that rock, giving rise to a tall herb vegetation. We shall call this D4.1a. Calcareous spring mires arise as small areas where the base-rich groundwater emerges as a spring in a deep peat locality creating a green herb rich circle in a peat moor. We shall call this D4.1b.

Axiophytes of D4.1a:

Agrostis canina
Calamagrostis stricta
Calamagrostis scotica
Carex paniculata
Lemna trisulca

Axiophytes of D4.1b:

Saxifraga hirculus

Axiophytes of the Sedge and Reed Beds Habitat D5

Interpretation of the habitat: Marshes with very wet ground but not with pools of open water. They can be sub-divided into:

Habitat D5.1 Dominated by Common Reed (*Phragmites australis*)

Habitat D5.2 Dominated by large sedges such as *Carex paniculata*

Habitat D5.3 Dominated by rushes such as *Juncus effusus*

Habitat D5.1 has no axiophytes.

Axiophytes of Habitat D5.2:

Carex paniculata
Lemna trisulca

Axiophytes of habitat D5.3:

Agrostis canina
Calamagrostis stricta
Calamagrostis scotica

Axiophytes of the Inland Brackish Marshes Habitat D6

Interpretation of the habitat: Marshes which have both a freshwater supply and (usually periodic) a saline water supply such that there is a permanent mildly saline content in the soil. Typically they are around the tidal limit of a river or a sea spray zone on a clifftop.

Axiophytes:

Carex recta

Carex x grantii
Oenanthe crocata

Axiophytes of the Dry Grassland Habitat E1

Interpretation of the habitat: Only small areas of dry grassland occur on very well drained soil such as atop a large rock or on soil-covered scree on steep slopes.

Axiophytes:

Aira praecox
Aira caryophyllea
Aphanes arvensis
Erophila verna
Poa compressa
Thymus polytrichus

Axiophytes of the Mesic Grassland Habitat E2

Interpretation of the habitat: The most frequent grassland of Caithness growing on clay soil in normal levels of rainfall and sufficiently drained that it is not frequently flooded. It is usually adapted for agriculture either as grazing pasture or re-seeded after ploughing for crop production. Grassland infested with bracken belongs here.

Axiophytes:

Festuca pratensis
Festuca rubra
Poa annua
Poa humilis
Poa pratensis
Taraxacum cyanolepis
Heracleum sphondylium

Axiophytes of the Wet Grassland Habitat E3

Interpretation of the habitat: Seasonally or permanently wet grassland but not permanently waterlogged. On clay soil it will grow tall herbs and may be used for rough grazing to suppress the vigorous growth. Soft rush clumps is a good indicator of this type of ground. Permanently waterlogged ground is Group D habitats.

Axiophytes:

Alopecurus geniculatus
Filipendula ulmaria
Poa trivialis
Agrostis stolonifera

Axiophytes of the Alpine and Sub-alpine Grassland Habitat E4

Interpretation of the habitat: There are no places in Caithness with long snow lie so are all sub-alpine. The range includes acid grassy places in mountains, stony fell-field on mountain plateaux and more base-rich montane grassy places, but excludes wet flushes which are D2 or D4.

Axiophytes:

Alchemilla alpina
Festuca vivipara
Solidago virg-aurea
Carex bigelowii
Huperzia selago
Salix herbacea
Salix x cernua
Empetrum nigrum ssp. hermaphroditum
Arctostaphylos alpinus

Axiophytes of the Woodland Fringes and Clearings Habitat E5

Interpretation of the habitat: In any type of natural or planted woodland this refers to clearings and fringes which are characterised by a sufficient lack of tree cover that light levels are higher and soil nutrient levels are closer to the norms of the area.

Axiophytes:

Veronica montana
Digitalis purpurea
Primula vulgaris
Oxalis acetosella
Anemone nemorosa
Stellaria holostea
Ajuga reptans
Lonicera periclymenum
Teucrium scorodonium
Lysimachia nemorum
Geranium robertianum
Rubus saxatilis

Axiophytes of the Temperate Scrub (not ericoid) Habitat F3

Interpretation of habitat: The commonly encountered form is gorse scrub in which there is sufficient invasion of the grassland that light levels are reduced and a degree of shelter from wind is provided. Note that it can be Common Gorse *Ulex europaeus* or Welsh Gorse *Ulex gallii* as both are introduced alien species frequently encountered.

There are no axiophytes for this habitat.

Axiophytes of the Temperate Scrub (ericoid) Habitat F4

Interpretation of habitat: Much of the drier heathland, covered in dominant heather, comes under this category. The underlying peat should not be permanently saturated (a footprint should not flood immediately).

Axiophytes:

Agrostis vinealis
Antennaria dioica
Arctostaphylos uva-ursi
Arctostaphylos alpinus
Polygala serpyllifolia
Carex binervis
Huperzia selago
Eleocharis quiqueflora
Goodyera repens
Melampyrum pratense
Myrica gale
Neottia cordata
Potentilla erecta ssp strictissima
Pyrola media
Radiola linoides
Vaccinium vitis-idaea

Axiophytes of the Riverine and Fen Scrub Habitat F9

Interpretation of habitat: There are two distinct habitats in the county that come under this category. The river valley can often have a scrubland of small immature trees and shrubs of a non-ericoid type such as hazel, birch, willow, alder or juniper arising because the valley banks are of steep unstable till which is mineral-rich. This is Habitat F9.1 Riverine scrub. A different habitat occurs where the inland fens (Habitat 4.1a above) carry a willow or alder carr and become Habitat F9.2 *Salix* carr and fen scrub.

Axiophytes of habitat F9.1

Adoxa moschatellina
Ajuga reptans
Ajuga pyramidalis
Allium ursinum
Anemone nemorosa
Crepis paludosa
Corylus avellana
Equisetum pratense
Fragaria vesca
Galium boreale
Geranium sanguinum
Hierochloa odorata
Hypericum perforatum
Juncus alpinoarticulatus
Juniperus communis

Lepidium heterophyllum
Luzula sylvatica
Moehringia trinervia
Myriophyllum alterniflorum
Orchis mascula
Oropteris limbosperma
Phegopteris connectilis
Potentilla sterilis
Prunus padus
Ranunculus auricomus
Salix caprea
Salix phylicifolia
Senecio aquaticus
Sparganium erectum
Stellaria holostea
Trollius europaeus
Veronica beccabunga

Axiophytes of habitat F9.2:

Dactylorhiza purpurella
Angelica sylvestris
Agrostis canina
Dryopteris carthusiana
Glyceria fluitans

Axiophytes of the Hedgerow Habitat FA

Interpretation of habitat: Typically a linear planting of hawthorn or beech and includes a ground layer up to 1 metre wide on either side of the planting. The hedgerow is regularly trimmed to keep it as a shrubby line. It is still a hedgerow if there are occasional trees in the line. However a hedge that has been allowed to grow into an irregular line of trees becomes a Line of Trees Habitat G5

Axiophytes:

Veronica montana
Stellaria graminea
Stellaria holostea
Vicia cracca
Vicia sepium
Prunus spinosa
Rubus idaeus
Ribes uva-crispa
Trifolium pratense
Festuca gigantea

Axiophytes of the Broadleaved Deciduous Woodland Habitat G1

Interpretation of the habitat: Woodland contains a majority of mature trees. Deciduous woodland contains few conifers except for juniper which may be a natural undershrub. The naturally frequent

trees in Caithness are birch–ash - aspen- alder or hazel. The habitat includes the tree canopy layer, the undershrub layer and the ground layer.

Axiophytes:

Ajuga pyramidalis
Betula pubescens
Corylus avellana
Sorbus aucuparia
Prunus avium
Prunus padus
Populus tremula
Anemone nemorosa
Bromus racemosus
Luzula sylvatica
Lysimachia nemorum
Oxalis acetosella
Stellaria holostea
Teucrium scorodonia
Oxalis acetosella
Galium saxatile
Primula vulgaris
Trientalis europaeus
Sanicula europaea

Axiophytes of the Coniferous Woodland Habitat G3

Interpretation of habitat: There are no natural coniferous woodlands in Caithness so the category contains only the planted woodlands. The woodlands planted in the 1970's and later are too immature to be naturalised. Older woods e.g. Dunnet forest, are slowly taking on natural character.

Axiophytes:

Dryopteris dilatata
Pyrola minor
Goodyera repens

Axiophytes of the Mixed Deciduous and Coniferous Woodlands Habitat G4

Interpretation of the habitat: There are no natural mixed woodlands in Caithness so planted woodlands are the only items in this category. Policy woodlands such as Achvarasdale belong here. Any plantings older than 50 years will have taken on some of the character of this habitat

Axiophytes:

Dryopteris dilatata
Polypodium vulgare
Polypodium interjectum
Polypodium x mantoniae

Axiophytes of the Lines of Trees etc. Habitat G5

Interpretation of the habitat: This is a category for man-made boundaries and windbreak shelter-belt in which the thickness of the line is not sufficient to alter the character from that of the surrounding land and only a local microclimate is developed.

There are no Axiophytes in this category.

Axiophytes of the Screes Habitat H2

Interpretation of the habitat: Deep layers of frost-shattered rock usually at the bottom of an inland cliff or similar weathered rock feature so that the layer is deep enough to harbour a primitive rooting medium for plants. It excludes seashore fragmented rock (Habitat B2 perhaps) and mountainside high scree (Habitat E4 perhaps) and industrial scree from mining and quarrying (Habitat J3 perhaps).

Axiophytes:

Cystopteris fragilis
Asplenium viride
Polystichium aculeatum
Asplenium trichomanes
Asplenium ruta-muraria

Axiophytes of the Inland Cliffs, Outcrops and Rock Pavements Habitats H3

Interpretation of habitat: Sites where bare rock is exposed without thick soil overlay. There is often some soil or vegetation root-mat on the site. Cliffs are close to vertical rock faces; outcrops are steep enough that soil cover is washed away and areas of bare rock show; pavement is close to horizontal yet bare rock is exposed for some reason.

Axiophytes:

Briza media
Rubus saxatilis
Melica nutans
Brachypodium sylvaticum
Galium boreale
Lonicera periclymenum
Polystichium lonchitis
Elymus caninus
Asplenium adiantum-nigrum
Asplenium ruta-muraria
Asplenium trichomanes
Asplenium viride
Cystopteris fragilis
Dryopteris expansa
Lepidium heterophyllum
Draba incana

Polystichium lonchitis
Polystichium setiferum

Axiophytes of the Miscellaneous Inland Bare Habitats H5

Interpretation of the habitat: Section H is about bare rock as a habitat. This category is a catch-all for any situations where rock is exposed but it does not fit in the categories above. Man-made exposures and linear boundary features involving bare natural bedrock fit here.

Axiophytes:

Arabidopsis thaliana

Axiophytes of the Arable Land Habitat I1

Interpretation of habitat: Land in use for arable farming which has been ploughed and is in current cultivation, or was in recent years, so that only annual plants and fast-spreading weeds of cultivation are present.

Axiophytes:

Lamium confertum
Glebionis segetum
Polygonum boreale

Axiophytes of the Cultivated Areas of Parks and Gardens Habitat I2

Interpretation of the habitat: This category covers bare soil situations in parks and private gardens in which a variety of alien plants may be growing currently or have grown in recent years. It excludes grassland areas of parks and gardens.

Axiophytes:

Lamium confertum
Galium boreale

Axiophytes of the Buildings of Town and Village Habitat J1

Interpretation of the habitat: The actual buildings including roof slates, gutters, wall surfaces and insides.

Axiophytes:

Cymbalaria muralis
Asplenium trichomanes
Arabidopsis thaliana

Festuca ovina

Axiophytes of the Low Density Buildings Habitat J2

Interpretation of habitat: Areas with scattered buildings but not much hard surface between them so that waste ground is soft. Includes camp sites, industrial sites such as Scrabster fish processing area, Dounreay. Sea walls are included here but not harbours.

There are no axiophytes for this habitat.

Axiophytes of the Extractive Industrial Sites Habitat J3

Interpretation of the habitat: This applies to slate quarries and stone crushing quarries as well as sand quarries.

There are no axiophytes for this habitat.

Axiophytes of the Transport Networks and Hard Surface Areas Habitat J4

Interpretation of the habitat: This applies to the hard surface areas of harbour quays, railway stations and bus termini. Also roads, car parks.

Axiophytes:

Puccinellia distans ssp. *borealis*
Cochlearia danica
Juncus ranarius

Axiophytes of the Artificial Waters and Associated Structures Habitat J5

Interpretation of the habitat: Mill ponds and races, water reservoirs, boating ponds, quarry holes and similar features.

There are no axiophytes for this habitat.

Axiophytes of the Waste Deposits Habitat J6

Interpretation of the habitat: Waste tips such as Seater, disused tips such as at Thurso golf course, filled quarry holes such as Castletown. It does not include pure quarry waste piles which are habitat J3.

There are no axiophytes for this habitat.

References

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Annexe 1 Full List of Axiophytes in Caithness

Adoxa moschatellina
Agrostis canina
Agrostis stolonifera
Agrostis vinealis
Aira caryophylla
Aira praecox
Ajuga pyramidalis
Ajuga reptans
Alchemilla alpina
Allium ursinum
Alopecurus geniculatus
Ammophila arenaria
Anemone nemorosa
Angelica sylvestris
Antennaria dioica
Anthyllis vulneraria
Aphanes arvensis
Apium inundatum
Arabidopsis thaliana
Arctostaphylos alpinus
Arctostaphylos uva-ursi
Armeria maritima
Asplenium adiantum-nigrum
Asplenium marinum
Asplenium ruta-muraria
Asplenium trichomanes
Asplenium viride
Aster tripolium
Atriplex glabriuscula
Atriplex hastata
Atriplex laciniata
Atriplex x taschereau
Betula pubescens
Blysmus rufus
Botrychium lunaria
Brachypodium sylvaticum
Briza media
Bromus racemosus
Cackile maritima
Calamagrostis scotica
Calamagrostis stricta
Callitriche stagnalis
Campanula rotundifolia
Carex acutiformis
Carex aquatilis
Carex arenaria
Carex bigelowii
Carex binervis
Carex capillaris

Carex echinata
Carex lasiocarpa
Carex limosa
Carex maritima
Carex paniculata
Carex pauciflora
Carex pulicaria
Carex recta
Carex rostrata
Carex x grantii
Catabrosa aquatica var uniflora
Cochlearia danica
Coeloglossum viride
Corylus avellana
Crepis paludosa
Cymbalaria muralis
Cystopteris fragilis
Dactylorhiza incarnata
Dactylorhiza incarnata ssp pulchella
Dactylorhiza purpurella
Deschampsia setacea
Digitalis purpurea
Draba incana
Drosera intermedia
Drosera x obovata
Dryopteris carthusiana
Dryopteris dilatata
Dryopteris expansa
Eleocharis multicaulis
Eleocharis quiqueflora
Eleogiton fluitans
Elymus caninus
Empetrum nigrum ssp. hermaphroditum
Equisetum fluviatile
Equisetum pratense
Equisetum telmateia
Equisetum variegatum
Eriophorum latifolium
Erodium cicutarium ssp. dunense
Erophila verna
Euphrasia foulaensis
Euphrasia reayensis
Festuca gigantea
Festuca ovina
Festuca pratensis
Festuca rubra
Festuca rubra ssp juncea
Festuca vivipara
Filipendula ulmaria
Fragaria vesca
Galium boreale

Galium verum
Gentianella amarella
Gentianella campestris
Geranium robertianum
Geranium sanguinum
Geum x intermedium
Glaux maritime
Glebionis segetum
Glyceria fluitans
Goodyera repens
Hammarbya paludosa
Heracleum sphondylium
Hierochloa odorata
Hippuris vulgaris
Honkenya peploides
Huperzia selago
Hypericum perforatum
Isoetes echinospora
Isoetes lacustris
Juncus alpinoarticulatus
Juncus balticus
Juncus bulbosus
Juncus gerardii
Juncus ranarius
Juniperus communis
Juniperus communis ssp nana
Koeleria macrantha
Lamium confertum
Lemna trisulca
Lepidium heterophyllum
Leymus arenarius
Ligusticum scoticum
Littorella uniflora
Lobelia dortmanna
Lonicera periclymenum
Lotus pedunculatus
Luzula sylvatica
Lysimachia nemorum
Melampyrum pratense
Melica nutans
Menyanthes trifoliata
Mertensia maritima
Moehringia trinervia
Myosotis laxa
Myosotis scorpioides
Myosotis secunda
Myrica gale
Myriophyllum alterniflorum
Myriophyllum spicatum
Neottia cordata
Neottia ovata

Nymphaea alba
Oenanthe crocata
Ophioglossum lusitanicum
Ophioglossum vulgatum
Orchis mascula
Oropteris limbosperma
Osmunda regalis
Oxalis acetosella
Parnassia palustris
Pedicularis palustris
Persicaria amphibia
Phegopteris connectilis
Phragmites australis
Pilosella officinarum
Plantago coronopus
Poa annua
Poa compressa
Poa humilis
Poa pratensis
Poa trivialis
Polygala serpyllifolia
Polygonum amphibium
Polygonum boreale
Polypodium interjectum
Polypodium vulgare
Polypodium x mantoniae
Polystichium aculeatum
Polystichium lonchitis
Polystichium setiferum
Populus tremula
Potamogeton alpinus
Potamogeton berchtoldii
Potamogeton crispus
Potamogeton filiformis
Potamogeton friesii
Potamogeton gramineus
Potamogeton natans
Potamogeton perfoliatus
Potamogeton x nitens
Potentilla erecta ssp. strictissima
Potentilla palustris
Potentilla sterilis
Primula scotica
Primula veris
Primula vulgaris
Primula x polyantha
Prunus avium
Prunus padus
Prunus spinosa
Puccinellia distans ssp. borealis.
Pyrola media

Pyrola minor
Radiola linoides
Ranunculus auricomus
Ranunculus flammula ssp minimus
Ranunculus hederaceous
Ranunculus trichophyllus
Rhynchospora alba
Ribes uva-crispa
Rubus idaeus
Rubus saxatilis
Rumex crispus ssp littoreus
Sagina maritima
Salix caprea
Salix herbacea
Salix phylicifolia
Salix x cernua
Sanicula europaea
Saxifraga hirculus
Schoenoplectus tabernaemontani
Sedum rosea
Selaginella selaginoides
Senecio aquaticus
Silene uniflora
Solidago virg-aurea
Sorbus aucuparia
Sparganium angustifolium
Sparganium emersum
Sparganium erectum
Spergularia media
Stellaria graminea
Stellaria holostea
Taraxacum cyanolepis
Teucrium scorodonia
Teucrium scorodonium
Thalictrum minus
Thymus polytrichus
Trientalis europaeus
Trifolium pratense
Tripleurospermum maritimum
Trollius europaeus
Vaccinium microcarpum
Vaccinium vitis-idaea
Valerianella locusta
Veronica beccabunga
Veronica montana
Vicia cracca
Vicia sepium
Viola palustris

