

# 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).

<b>Table 1 European Habitat Classification Applied to Caithness land surface</b>	<b>Notes</b>
<b>A – Marine habitats</b>	
A1 - Littoral rock & other hard substrata	
A2 – Littoral sediment	
A3 – Infra-littoral rock	
<b>B – Coastal habitats</b>	
B1 – Coastal dunes & sandy shores	
B2 – Coastal shingle	
B3 – Rock cliffs, ledges and shores	
<b>C – Inland Surface Waters</b>	
C1 – Surface standing waters	
C2 – Surface running waters	
C3 – Littoral zone of inland surface waters	
<b>D – Mires, Bogs &amp; Fens</b>	
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	
<b>E – Grasslands and others</b>	
E1 – Dry grasslands	
E2 – Mesic grasslands	
E3 – Wet grasslands (not waterlogged)	
E4 – Alpine & subalpine grassland	
E5 – Woodland fringes & clearings	
<b>F – Heathland and scrub</b>	
F3 – Temperate scrub (not ericoid)[incl. gorse]	
F4 – Temperate scrub (ericoid)	
F9 – Riverine & fen scrub	
FA – Hedgerows	
FB – Shrub plantation	
<b>G – Woodland and others</b>	
G1 – Broadleaved deciduous woodland	
G3 – Coniferous woodland	
G4 – Mixed Broadleaved & Coniferous woods	
G5 – Lines of trees etc.	
<b>H – Inland unvegetated habitats</b>	
H2 – Screes	
H3 – Inland cliffs, outcrops & rock pavement	
H5 – Miscellaneous inland bare habitats	

<b>I Regularly or recently cultivated habitats</b>	
I1 – Arable land	
I2 – Cultivated areas of parks & gardens	
<b>J Constructed, industrial &amp; other land</b>	
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 taschereaui*  
*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 Screens 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

Butler, J.K. 2013 *A Habitat Catalogue for Caithness*. In <http://www.caithnessbiodiversity.org.uk/>

Dandy, J.E. 1969. *Watsonian Vice-counties of Great Britain*. The Reay Society, London.

Walker, K.J., Dines, T., Hutchinson, N. & Freeman, S. 2010. Designing a New Plant Surveillance Scheme for the UK. JNCC report no. 440. JNCC, Peterborough.

Davies, C.E., Moss, D. & Hill, M.O., 2004, EUNIS Classification Revised 2004. Report to European Environment Agency.

## Annexe 1 Full List of Axiophytes in Caithness

Adoxa moschatellina  
Agrostis canina  
Agrostis stolonifera  
Agrostis vinealis  
Aira caryophyllea  
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 hederaceus  
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





