

## *Phleum alpinum* L.

### Alpine Cat's-tail

A scarce alpine grass with distinctive purplish flower heads, long bristly awns and short, broad and glabrous leaves. It is associated with base-rich flushes and mires, more rarely with rocky habitats, and occasionally with weakly acid substrates enriched by flushing with base-rich water. In Britain it is more or less confined to above 610 m northern and central Scotland with two southern outliers in the North Pennines. It is assessed as of Least Concern in Great Britain, but in England it is assessed as Critically Endangered, due to very restricted numbers and recent decline.



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#### IDENTIFICATION

*Phleum alpinum* is a shortly rhizomatous, loosely tufted perennial alpine grass with short, broad, glabrous leaves (~6 mm) and short, blunt ligules (0.5–2 mm; Cope & Gray 2009). The uppermost leaf sheath is inflated.

The inflorescences are dark-blue or brownish purple, oval to oblong shaped (10–50 mm). The spikelets are purplish with long awns (2–3 mm) and the keels are fringed with stiff white bristles.

#### SIMILAR SPECIES

*Phleum alpinum* is told from *P. pratense* and *P. bertolonii* by its inflated leaf sheath, shorter inflorescence and longer glumes (>5 mm) and awns (>2 mm). The upper altitudinal



*Phleum alpinum* at Crowdundle Beck, Cumbria. ©Jeremy Roberts.

limit for both these species (540 m) is well below the lower limit for *P. alpinum* in Britain (610 m). However, *P. pratense* has been recorded as an introduction at 845 m near to the *P. alpinum* on Great Dun Fell (Pearman & Corner 2004).

*Alopecurus magellanicus*, with which it often grows, has hairy, awnless glumes and 'thunder-cloud' coloured flower-heads (red-purple in *P. alpinum*; Raven & Walters 1956).

#### HABITATS

*Phleum alpinum* is a montane grass of open, rocky habitats or of closed swards on base-rich substrates, or occasionally on more acidic materials enriched by flushing or down-washed sediment (Ratcliffe 1994).

It can grow on dry rock faces (see photo opposite), but most habitats are moist flushes and mires associated with NVC M32 *Philonotis fontana*-*Saxifraga stellaris* and M33 *Pohlia wahlenbergii* var. *glacialis* spring vegetation, sometimes receiving melt-water from late snow patches in high corries, hollows or from water dripping down ravines and cliffs.

In Britain it is often present with *A. magellanicus*, *Carex bigelowii*, *Juncus castaneus*, *Luzula multiflora* and *Nardus stricta* (Cope & Gray 2009).

#### BIOGEOGRAPHY

*Phleum alpinum* is a bipolar Boreo-arctic Montane species. It is widespread in northern regions and in the mountain ranges of Europe, Asia and North America, and in the Southern Hemisphere it occurs on high mountains in Chile, Argentina, and on South Georgia in Antarctica (Cope & Gray 2009).

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In Britain, *P. alpinum* is most abundant in the mountains of northern and central Scotland where it has been recorded from c. 70 sites, with its most northerly records in recent times from Ben Wyvis, East Ross. In the North Pennines it survives precariously at two sites on Cross Fell where there are perhaps as few as 23 plants in total, although it is possible that the populations are much larger as vegetative plants are difficult to identify with certainty and are easily over-looked (Roberts 2010a). It has not been seen in recent years on Helvellyn, the only other station recorded south of the Scottish Highlands (Halliday 1997).

The altitudinal range in Scotland is from 610 m on Braeriach up to 1220 m on Cairntoul, both in the Cairngorms National Park. The North Pennine populations are at between 690 - 700 m (formerly to 900 m on Helvellyn).

All British plants are tetraploid ( $2n = 28$ ) and belong to subsp. *alpinum* (syn. *P. commutatum*). The diploid subsp. *rhaeticum* ( $2n = 14$ ) is confined to the mountains of central and southern Europe (Cope & Gray 2009).

### ECOLOGY

*Phleum alpinum* is a shortly rhizomatous perennial grass that flowers from early July to early or mid-August. During the winter plants undergo a period of dormancy, subsequently broken by the retreat of the overlying snow (Heide 1990).

Flowering only occurs on tillers that are at least a year old. Observations in the North Pennines suggest that plants are relatively short-lived and therefore that *P. alpinum* must rely

on recruitment from seed to persist at many sites (Roberts 2010b). Consequently failure to set seed over several seasons could result in dramatic population fluctuations given its limited capacity for vegetative spread (Cope & Gray, 2009).

The length of the growing season appears to be the most critical factor limiting the abundance and distribution of *P. alpinum* (Callaghan 1974). In South Georgia, where it has a wide distribution, reproductive output (number of inflorescences, florets and seed) is correlated with the severity of the environmental conditions (Callaghan & Lewis 1971).

However, at the limit of the species range in the arctic, *P. alpinum* often fails to set seed, though seedling recruitment does occur in occasional long growing seasons, leading to fluctuating population densities (Callaghan 1974). Longer day lengths increase both vegetative and reproductive performance in Norwegian and South Georgian populations (Heide & Solhaug 2001).

Predictions concerning the response of arctic-alpine plants to climate change have suggested that distributional limits will increase in altitude with warming, with the result that, in general terms, arctic-alpine populations at lower altitudes are at risk of being displaced by lowland species. However, experiments simulating the responses of *P. alpinum* (high altitude) and *Dactylis glomerata* (low altitude) to increased CO<sub>2</sub> levels and high wind speed found that the growth of *P. alpinum* may actually be stimulated by such conditions, whereas the growth of *D. glomerata* at higher altitudes would be restricted (Woodward 1993).

### THREATS

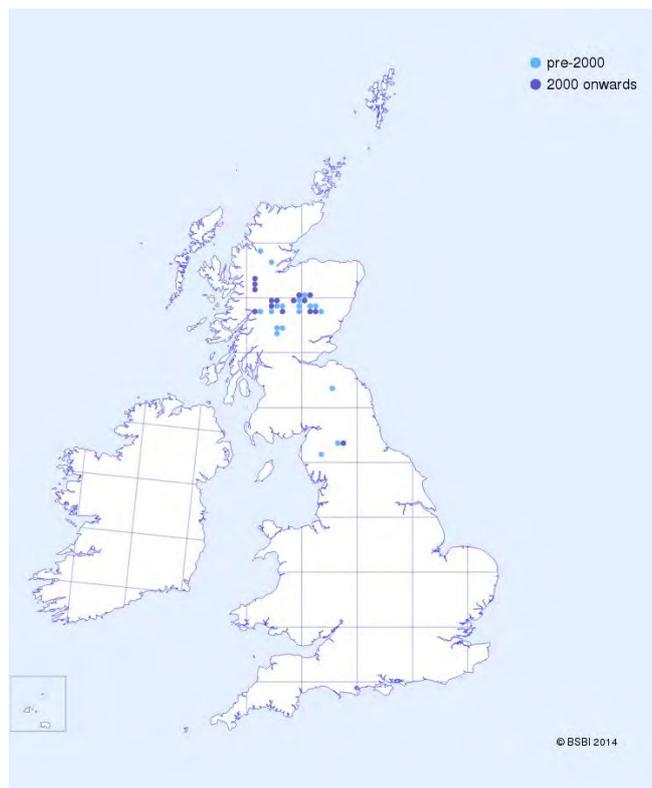
Most of the English and Scottish habitats of *P. alpinum* are lightly grazed, but heavy grazing appears to be a partial cause of its present restriction, especially in Northern England. The small North Pennine populations have also suffered from over-collecting and drought in the past and, due to their critically small size, are highly susceptible to rock-falls and competition from more competitive species (Halliday 1997; Roberts 2010a).

### MANAGEMENT

*P. alpinum* tolerates extensive grazing regimes at low stocking pressures. Due to its reliance in Britain on recruitment from seed, high stocking rates that restrict flowering are likely to have an adverse effect on extant populations.

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Distribution of *Phleum alpinum* in Great Britain and Ireland.

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