County: Cumbria **Site Name: Buttermere Fells**

District: Allerdale

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act, 1981.

Local Planning Authority: Lake District Special Planning Board

National Grid Reference: NY 200195 **Area:** 6,073.9 (ha) 15,008.7 (ac)

Ordnance Survey Sheet 1:50,000: 89 **1:10,000:** NY 11 SE, NE
NY 12 SE, NE
NY 21 NW, SW, NE
NY 22 SW

Date Notified (Under 1949 Act): 1975 **Date of Last Revision:** 1975

Date Notified (Under 1981 Act): 1989 **Date of Last Revision:** 1989

Other Information:

1. The site lies within the Lake District National Park.
2. The site has been modified by extensions and deletions during this revision.
3. The site is listed in 'A Nature Conservation Review', edited by D. A. Ratcliffe, 1977, published by Cambridge University Press.
4. The site is adjacent to Chapel Bridge Meadows, Honister Crag, Lodore & Troutdale Woods and Hollows Farm Section SSSI.
5. Part of the site was formerly notified as Keskadale and Birkrigg Oaks SSSI.

Description and Reasons for Notification:

These steep-sided, precipitous hills lie between Keswick and Buttermere, and rise to 851 m on Grasmoor. The main biological interest lies in the range and extent of montane and sub-montane dwarf shrub heath communities. The site supports the largest known area of bilberry *Vaccinium myrtillus* heath in the Lake District, and the area of heather *Calluna vulgaris* is second only to that found on the Skiddaw Massif. The site also supports a range of ombrogenous and soligenous mires, areas of grassy *Racomitrium lanuginosum* heath on the summits of Grasmoor and Grisedale Pike, and the nationally important sessile oak woods of Keskadale and Birkrigg. The site is a locality for the nationally rare alpine catchfly *Lychnis alpina*. As a result of the diversity of plant communities Buttermere Fells supports breeding peregrine, merlin and raven and occasionally dotterel. This is one of only two sites in the Lake District where twite breed.

Except for the ridge to the south of Nitting Haws, where the rocks belong to the Borrowdale Volcanic Group, they are formed entirely of Skiddaw Slates. These slates differ from those of the Skiddaw massif in their tendency to form cliffs. As a result the combination of topography and vegetation on Buttermere Fells is not duplicated elsewhere in the Lake District.

The Skiddaw Slates weather to produce acid soils with only very localised nutrient-rich (basic) flushing. Consequently the vegetation is a matrix of large stands of acid-loving heaths, grasslands and mires, broken by occasional patches of less widespread plant communities such as springs, flushes and woodland. Although the hills have always been managed for sheep rather than grouse, dwarf-shrub heaths are still slightly more extensive than grasslands. There

are over 800 ha of heather heath. The most frequent associated species of the sub-montane heath are bilberry, crowberry *V. vitis-idaea* and mosses such as *Hylocomium splendens*, *Pleurozium schreberi* and *Plagiothecium undulatum*. However, on Whiteside, Grasmoor End, Causey Pike and High Spy there is a montane heath of wind-flattened heather, growing with dwarf juniper *Juniperus communis* spp. *nana*, cross-leaved heath *Erica tetralix*, crowberry *Empetrum nigrum* and, very locally, bearberry *Arctostaphylos uva-ursi*, a rare habitat recorded from only a few sites in England. On Hobcarton and Hobcarton End there is a stand of prostrate, wind-flattened heather heath, with lichens and montane species such as the club-moss *Diphasiastrum alpinum*. This is probably the best example of this type of vegetation in the Lake District

The bilberry heaths are more extensive here than on any other site in North West England. There are over 360 ha of sub-montane heath, which includes species such as cowberry, mat-grass *Nardus stricta* and mosses. Some of this heath has apparently replaced heather heath after grazing and burning. Above about 550 m the bilberry heath grades into a montane form, distinguished by lichens including species of *Cladonia*, *Cetraria*, *Alectoria nigricans*, *Ochrolechia frigida* and the club-mosses *Diphasiastrum alpinum* and *Huperzia selago*.

The grasslands on Buttermere follow a pattern common to all the upland sites in the Lake District. On the lower, drier slopes there is bent-fescue *Agrostis-Festuca* grassland, some of which is invaded by bracken *Pteridium aquilinum*. This gives way to mat-grass and heath-rush *Juncus squarrosus* grasslands on damper soils higher up.

Ombrogenous or blanket-mires are rare because there is so little flat ground where peat can form, but there is a very fine example of deer grass-hair's-tail cottongrass *Trichophorum cespitosum-Eriophorum vaginatum* blanket-bog on High Scawdel. It is very wet, with a well-developed system of pools containing bogbean *Menyanthes trifoliata* and bottle sedge *Carex rostrata*. Round-leaved sundew *Drosera rotundifolia*, deer grass and the mosses *Sphagnum papillosum*, *S. capillifolium* and *S. cuspidatum* are all abundant.

Most of the valley bottoms are poorly drained, with more or less extensive mires. These are variously dominated by sedges *Carex* spp. and rushes *Juncus* spp. with *Sphagnum* moss. Bryophyte-dominated spring-heads and small sedge-mires, sometimes base-rich, are quite common on the slopes.

The summits and high ridges are covered with a montane grassland dominated by sheep's fescue *Festuca ovina* and including dwarf willow *Salix herbacea*, stiff sedge *Carex bigelowii*, wavy hair-grass *Deschampsia flexuosa* and several bryophytes and lichens. The woolly fringe moss *Racomitrium lanuginosum* heath on Grasmoor, once extensive, is now confined to two patches within the montane grassland, probably because of over-grazing by sheep. There are also small areas of moss-heath on the north side of Grisedale Pike.

The cliffs are mostly acidic and only sparsely vegetated. However, they are a refuge for dwarf-shrub heaths and trees, such as birch *Betula pubescens*, rowan *Sorbus aucuparia* and yew *Taxus baccata*, especially on the ridge between Cat Bells and High Scawdel. Parsley fern *Cryptogramma crispa* is ubiquitous on screes. Hobcarton Crag is one of only two known localities in Britain for alpine catchfly *Lychnis alpina*. White alpine cinquefoil *Potentilla crantzii*, a locally rare species, has been recorded on several crags.

Two blocks of high altitude sessile oak *Quercus petraea* woodland occur at Keskadale and Birkrigg on steep south facing slopes near the altitudinal limit for oak in Cumbria. They are of significance as relics of a previously extensive high level woodland cover now almost totally

lost due to clearance and grazing. Sessile oak is the dominant species with associates including rowan, holly, birch, hawthorn, pine and larch. The ground flora of the woods is poor as a result of shading and grazing and is predominantly a mosaic of grasses and heathland. Species include wavy hair-grass, common bent, sheep's fescue, sweet vernal-grass, heather and bilberry. Mosses and lichens are abundant, and include *Hedwigia integrifolia*, a rare montane moss found on rock slabs, and two lichens *Alectoria chalybeiformis* and *Usuea frugilescens* for which this is the only site in the Lake District.

Buttermere Fells is also important for a range of geological exposures and geomorphological features.

Buttermere Outcrops:
A group of natural and quarried outcrops around Buttermere village provide excellent exposures of Skiddaw Slates demonstrating complex geological structures formed during the Caledonian mountain building episodes (orogeny). At Long How, slates and siltstones display sharp, steeply plunging folds of two generations, formed by succeeding phases of crustal compression during the orogeny. Above the path alongside Mill Beck, tight, upright folds of the second generation recognised at Long How are refolded by open, flat-lying folds of a third generation. Complex fold structures are also displayed in Buttermere Quarry where sedimentary structures provide important way-up evidence and several sets of lineations can be seen. All three sets of folds, with associated cleavages, can be seen in an ice polished slate outcrop adjacent to Buttermere Church. These outcrops are important in providing a clear and accessible demonstration of the sequence of structural events that affected the Skiddaw Slates during the Caledonian Orogeny.

Gasgale Crags and Whiteside:
The crags and outcrops on Gasgale Crags and Whiteside provide excellent exposures of rocks of the Skiddaw Group, contorted by complex fold structures. Divisions of the Skiddaw Slates known as the Kirkstile Slates and the Loweswater Flags are represented here. Fold structures belonging to several different generations are developed and the slate layers have a well developed cleavage (closely spaced parallel fractures). Most of the folds were produced by crustal compression during the Caledonian mountain building episode (orogeny). Earlier folds can also be observed, however, formed by slumping of unconsolidated sediment downslope on the sea bed, probably triggered by earthquake shocks. These outcrops have been intensively studied and provide some of the best continuous exposures of structures in the Skiddaw Slate Group.

Hassness and Goat Crag:
A prominent outcrop in the grounds of Hassness provides an important exposure of sandstones and slates of the Skiddaw Group. At this locality the rock layers are contorted by complex folds of two generations formed during the Caledonian mountain building episode (orogeny). It was here that the effects of these first and second generation folds were first clearly distinguished and explained. This provided an important key to the understanding of the geological structure of the Lake District, making Hassness a critical locality for studies of these structures. First generation folds of a different style are also well exposed on Goat Crag, where it can be clearly seen that they predate the main cleavage which must therefore be related to the second generation folds. These exposures at Hassness and Goat Crag were instrumental in resolving a long-running debate over the sequence of geological structures in the Lake District and unravelling the complex pattern of major fold structures in the area.

Long Combe:

The Lake District forms a geographically well-defined base-metal orefield. The sulphide mineralisation occurs as vein deposits and is notably diverse in terms of both the nature of the ores and their age.

At Long Combe a mineralised quartz vein, trending north-south, cuts slates of the Ordovician Skiddaw Group. The mineralisation, which is unique in the Lake District, is believed to be of Lower Devonian age. Arsenopyrite is the dominant ore mineral and is accompanied by microscopic occurrences of the cobalt-iron-sulpharsenides glaucodot and alloclase. This is the only British locality at which the occurrence of alloclase has been authenticated. Cobaltite, marcasite, bismuth and bismuthinite are also present. The vein also carries small quantities of wavellite and variscite, both rare aluminium phosphates. Supergene minerals present include scorodite and erythrite.

Grasmoor:
Grasmoor is important for studies of periglacial processes. It demonstrates good examples of stone stripes, together with associated gelifluction lobes and terraces, developed on the Kirkstile Slates division of the Skiddaw Slates. Contemporary downslope rates of movement of surface stones have been measured at 15–20 cm a^{-1}. In conjunction with Skiddaw and Helvellyn, Grasmoor is important for comparative studies of periglacial activity in the Lake District. These have shown that both frost and mass movement are involved in the formation of the stone stripes and that their relative importance depends on both local environmental conditions and lithology.

Dale Head North and South Mines:
At Dale Head in the Vale of Newlands, two contrasting types of copper mineralisation can be seen in close proximity. Dale Head North Mine is located on an east-west trending vein. The mineralisation is typical of the Lower Devonian chalcopyrite-pyrite-arsenopyrite type of Lake District mineralisation. Bismuth and cobalt minerals are also present. The vein, which is superbly exposed, has been the subject of detailed study in recent years and is probably the best example of its type in the Lake District.

Copper mineralisation of a somewhat different character is present at Dale Head South. The mineralisation can be studied in old dumps, and less easily at outcrops on the slopes leading up to Dale Head. The primary ore minerals here are bornite, djurleiite and minor chalcopyrite. A rich supergene assemblage is also present but has not been studied in detail to date. South Vein is also notable for examples of striking replacement textures, developed by the replacement of bornite by chalcopyrite, goethite and malachite.