Scottish Natural Heritage

KEEN OF HAMAR
Site of Special Scientific Interest

SITE MANAGEMENT STATEMENT

Site code: 827

Northern Isles Area
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Purpose

This is a public statement prepared by SNH for owners and occupiers of the SSSI. It outlines the reasons it is designated as an SSSI and provides guidance on how its special natural features should be conserved or enhanced. This Statement does not affect or form part of the statutory notification and does not remove the need to apply for consent for operations requiring consent.

We welcome your views on this statement.

Natural features of Keen of Hamar SSSI	**Condition of feature (and date monitored)**	**Other relevant designations**
Mineralogy of Scotland	Favourable, maintained (July 2003)	Punds to Wick of Hagdale SSSI
Calaminarian grassland and serpentine heath	Favourable, maintained (October 2010)	Keen of Hamar SAC
Vascular plant assemblage	Unfavourable, no change (August 2006)	

Features of overlapping SSSI or Natura sites that are not notified as natural features of Keen of Hamar SSSI	**Condition of feature (date monitored)**	**SPA or SAC or SSSI**
Grasslands on soils rich in heavy metals	Favourable, maintained (September 2004)	SAC
Base-rich scree	Favourable, maintained (October 2010)	SAC
Dry heaths	Favourable, maintained (October 2010)	SAC
Ordovician Igneous geology	Favourable, maintained (July 2003)	Punds to Wick of Hagdale SSSI

Description of the site

The Keen of Hamar Site of Special Scientific Interest (SSSI) is located to the north-east of Baltasound on the east coast of Unst. It comprises two fenced areas (the upper Keen and lower Keen) which together also make up the Keen of Hamar Special Area of Conservation (SAC), and a 'cattle corridor' between the two fields which provides a route for the neighbouring farm to move animals between fields to the north and south. In addition the SSSI includes the area of old chromite workings to the north, the coastline from Geo of Hagdale to Muckle Geo of the Keen and a number of small strips of land around the fenced areas.

The Keen of Hamar SSSI lies on the main Shetland Ophiolite block that runs in a roughly NNE-SSW orientation through Unst. An ophiolite is a sequence of igneous rocks that represents a part of the oceanic crust. The Shetland Ophiolite was emplaced over the continental crust between 400 and 500 million years ago. During this process the original rocks were altered by intense heat and pressure. On

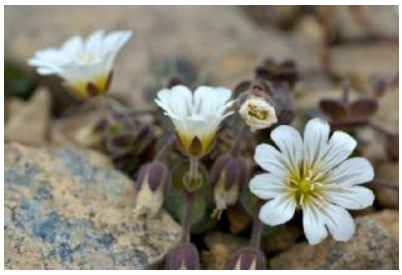
the Keen of Hamar, the main rock found is dunite-serpentine weathered to a characteristic ochre-brown colour.

One important feature of these ultrabasic rocks is the presence of chromite mineralisation. In the vicinity of the Keen there are well developed layers of chromite which have been exploited commercially, with the best and most productive site in Britain at Hagdale Quarry. Although the quarry itself is now infilled, excellent samples of chromite ore and vein serpentine are present on the spoil dumps. The chromite mineralisation occurs as lenses within the serpentine host rock. At the Wick of Hagdale, chromite ore can be observed in its original position within the serpentine outcrops along the shore. 5 cm thick bands and clots of chromite crystals up to 1 cm in diameter are visible. There are a number of other important minerals associated with the chromite including nickel hydroxides and platinum group elements.

There is a clear link between the geology of the site and its botanical interest. Just over half the site is covered by bare serpentine debris and rock outcrops with the remainder having a variety of thin soils derived from glacial till, which support herb-rich heath similar to that found elsewhere on Unst and on Fetlar. Calaminarian grassland – a plant community affected by high concentrations of heavy metals in the soil – occurs on serpentine debris. This is a rare habitat in national terms, and its nearest equivalents are similar habitats in parts of Fennoscandia. The designation of the Keen as a Special Area of Conservation illustrates the international importance of its habitats.

As well as rare habitats, the site supports three plant species with a highly restricted distribution in the UK - northern rock-cress, Scottish sandwort (also known as Norwegian or Arctic sandwort) and the endemic (i.e. found nowhere else in the World) Shetland mouse-ear, also called Edmondston's chickweed. This plant is the only known example of a serpentine endemic in North West Europe. Other species such as sea plantain and scurvy grass have distinct serpentine growth forms of uncertain taxonomic status (i.e. it is not known whether these represent distinct subspecies, or arise merely as a consequence of the peculiar environmental conditions that prevail on the Keen). A variety of other plants that are rare in Shetland are found on the site including fragrant orchid, early purple orchid, hoary whitlow grass, stone bramble and a type of eyebright. Another notable interest is the presence of a nationally rare leaf beetle, *Chrysolina intermedia*, which is thought to feed on sea plantain.

Shetland mouse-ear



In addition, the stone stripes that occur on the debris towards the summit of the Keen of Hamar are of geomorphological interest. The likely origin of such stripes is through solifluction – a process involving sorting stones according to size through frost heave and then thawing. What is unusual about this process at the Keen is that it occurs at such low altitudes: only 50 m above sea level.

The last condition monitoring found the mineral exposures visible and accessible (July 2003). Targets were met for Calaminarian Grassland and Serpentine Heath vegetation (October 2010). However, monitoring of northern rock-cress, Shetland mouse-ear and Scottish sandwort showed a decline in population numbers (April 2004 and August 2006).

Past and present management

The Keen may have been grazed by domestic animals such as cattle, sheep and ponies for several thousand years. There is no evidence of any human settlement on the Keen prior to the construction of a radar station on the hilltop early in WWII. This was removed in 1940, leaving only traces of hut emplacements and some local eutrophication (nutrient enrichment) of the ground nearby. It is not clear what the boundaries of the original unit were. The present condition of dry stone dykes in the vicinity of the site suggests that they have not been stock-proof for many years. It is likely then that much of the area from Wick of Hagdale to Swinna Ness was one large grazing unit.

In 1967, an area of land outside the SSSI to the south-east was surface seeded, limed and fertilised with a compound inorganic fertiliser. Much of this area was closed serpentine heath vegetation, though some areas of debris were included. The success of this 'improvement' is apparent to this day and forms a marked contrast with the SSSI. A few years later, in 1975, the upper Keen on the east of the SSSI was declared a National Nature Reserve (NNR) and entered in a Nature Reserve Agreement to preserve the serpentine debris habitat. The area was fenced and since then, domestic livestock have been excluded

and rabbit the only grazing animal. In contrast, the western area or lower Keen continued to be grazed by livestock and supplementary feeding was provided, causing localised nutrient enrichment. In 1987, both the upper and lower Keen were purchased by Scottish Natural Heritage's predecessor (the Nature Conservancy Council). A fence was erected to isolate the lower Keen, which has since remained ungrazed. A narrow 'cattle corridor' was retained between the two areas to allow livestock movement across the remainder of the grazing unit. It had also been used in the past for feeding livestock and this has led to poaching and dunging with the result that this small area no longer supports any significant botanical interest. The width of the corridor was subsequently reduced to enable land to revert to its former state and hopefully allow some of the rare plants to reappear. Though managed as such, the lower Keen and the cattle corridor did not formally become part of the NNR until it was re-declared in 2005.

On the NNR, SNH has adopted a non-intervention approach. It maintains boundary fences in stock-proof condition and domestic livestock are entirely excluded from the reserve. Exceptions to this rule are the experiment carried out in 1988 to remove turf and enriched soil in areas damaged by dumped cooking fat and cattle manure to encourage re-colonisation by natural vegetation, a more "surgical" attempt to remove enriched soil and vegetation in 2007, and experimental cutting and burning of small areas of heathland that is currently in progress. As a NNR, the site has been publicised through various media articles, leaflet and guided walks. Visitor numbers are believed to be in the hundreds per year. Facilities include a car park outwith the SSSI, gates, stiles and information panels. Besides, a considerable amount of research has been undertaken in recent years, notably by David Slingsby of Wakefield and Susanna Kay of Stirling University, to try and establish why normal vegetation succession has not occurred on the site and to increase understanding of the population dynamics of the Keen rarities.

The small areas of the SSSI outside the NNR are part of the neighbouring farm. The tenant has entered a Rural Priorities scheme management agreement under which cattle graze at low density the strip of serpentine heath on the north of the SSSI. The land on the south-west of the SSSI is grazed by sheep.

The Keen of Hamar area has been one of the major places in the UK for the mining of chromite. There are two small quarries within the upper Keen and one quarry within the lower Keen, while the SSSI also includes the large pit, now filled in, known as Hagdale chromite quarry. After initial discovery in about 1818, working in Unst started in 1820, though Hagdale did not start until about 1830. Production peaked in about 1840, declining thereafter until working ceased in 1877. During this time about 32,000 tons were extracted. A second period of quarrying occurred from 1908 to 1927 which involved re-working of the old spoil heaps and introduction of a crushing and concentrating plant. The Hagdale chromite quarry extended down some 35 meters but has since been capped. The infilled pit is surrounded by pastures grazed by cattle and is used for supplementary feeding. Encroaching vegetation on the quarry face will be removed by the tenant as part of a Rural Priorities agreement.

The only other mineral to be extracted commercially from the Keen of Hamar area has been serpentine itself, used as an industrial refractory. The quarry to the north of the lower Keen was the main source of serpentinite for export. Greatest use of this was made during the Second World War and for some years afterwards. Though shipments have now ceased, they continued intermittently into the 1970's.

Periodic interest has been shown in other minerals present in the serpentinite, associated with chromite. These include Platinum Group Elements (PGE) (platinum, palladium, iridium and osmium) as well as nickel, magnesium and kyanite (an aluminium silicate). However none of the proposed, or attempted, prospecting attempts has led to commercial exploitation of any of the above minerals. SNH now holds the mineral rights to the NNR.

Objectives for Management (and key factors influencing the condition of natural features)

We wish to work with the owner and occupier to protect the site and to maintain and where necessary enhance its features of special interest. SNH aims carry out site survey, monitoring and research as appropriate to increase our knowledge and understanding of the site and its natural features and to monitor the effectiveness of the management.

The EU Habitats and Birds Directives oblige Government to avoid, in SACs and SPAs, the deterioration of natural habitats and the habitats of species, as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of these Directives. The objectives below have been assessed against these requirements. All authorities proposing to carry out or permit to be carried out operations likely to have a significant effect on the European interests of this SSSI must assess those operations against the relevant Natura conservation objectives (which are listed on our website through the SNHi - SiteLink facility).

1. **To maintain the extent of serpentine debris habitat and associated populations of nationally rare and locally important plants**

Continue excluding stock from the fenced areas and keep up stock-proof boundaries in order to protect fragile plant species and stone stripes features. Encourage further research into the debris flora to increase understanding of populations' dynamics and the processes influencing them.

2. **To maintain the extent of serpentine heath habitat**

The intention is to retain a non-intervention approach on the NNR. Areas of closed vegetation showing signs of build up of plant litter may however need to be managed where there is a risk of losing species diversity within the sward. Although grazing is not favoured because of the impact it may have on debris communities, alternative control methods such as cutting or burning are being investigated.

3. **To maintain the areas of geological interest clearly visible and accessible**

Monitor impact of livestock grazing and supplementary feeding next to quarry faces and spoil heaps to ensure they are compatible with keeping vegetation under control and retaining safe access. Removal of encroaching vegetation, fencing of affected areas or changes in feeding practices should be considered if the condition of the notified features deteriorates.

4. **To continue to encourage responsible visitor access to the site providing it is compatible with nature conservation interests**

The NNR status requires providing for people's enjoyment and understanding. Interpretation and access features such as car park, gates and stiles are provided and maintained by SNH as part of the reserve management.

In the past concerns have been expressed about the fragility of the site and the potential for damage caused by trampling by visitors. The debris habitat is regularly subject to weathering and frost heave and the plant species growing there are adapted to cope with movement so trampling by the public is not generally thought to be a problem. Pedestrian access is therefore unrestricted across the reserve but formal routes may need to be established if trampling appears to have an adverse effect on debris habitat and rare plants.

Other factors affecting the natural features of the site

Climate change: There is now strong evidence to suggest that the climate of the British Isles is getting warmer. Arctic-alpine plants - a group to which the Keen rarities belong - are likely to be among the first plants to be displaced if this warming continues. Stone stripes created by a process of freezing/thawing may also be affected.

Mineral extraction: Should commercial exploitation of the Platinum Group Elements ever occur on Unst then considerable pressure to extract may eventually be placed on the Keen of Hamar. SNH however holds the mineral rights to the Reserve.

Date last reviewed: 16 February 2011