Scottish Wildlife Trust

Priority Species Profile

Scottish primrose

Primula scotica

This beautiful small flower is endemic to the north of Scotland, meaning it is found nowhere else in the world. To flourish, Scottish primroses require grasslands with carefully managed grazing, as populations are easily lost when more vigorous plant species are left to grow.

It is listed on the Government's Scottish Biodiversity List and is classified as being 'nationally scarce', although its overall population has remained unchanged since the 1960s[1].

[1] Online Atlas of the British & Irish Flora. http://www.brc.ac.uk/plantatlas/index.php?q=plant/primula-scotica Accessed 5/10/13

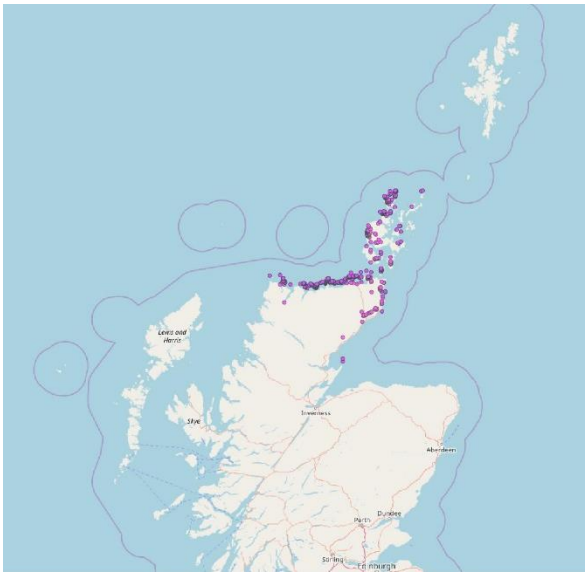
Description

Scottish primrose is a small plant and when in full flower is usually only a few centimeters high. The flowers are about 8mm in diameter, with five heart-shaped violet petals, and a bright yellow centre. The leaves form a rosette around the base of the stem.

Distribution

The Scottish primrose is endemic to a small area in the very north of Scotland and only found in the wild in Caithness, Sutherland and Orkney. The most recent survey[2] found it at 194 sites along the coast between Durness in north-west Sutherland and Dunbeath in north-east Caithness.

Most sites are within a few hundred metres of the sea and include cliff-tops, the transition zone between grassland and maritime heath, mosaics of heath and machair, and around rock outcrops. It is found on the Trust's Hill of White Hamars Wildlife Reserve.



Distribution of the Scottish primrose, *Primula scotica*
(From NBN Gateway: accessed 10/01/2018)

Ecology

Scottish primroses only reproduce from seed. They have two flowering periods: one in the early spring and one in summer, although many plants never flower. The species is mostly self-fertile, but cross-pollination by insects may result in more vigorous plants with greater longevity. The plant can only survive in short vegetation and often colonises small areas of bare soil which may be partly created by hoof prints[3]. It is perennial and mature plants can persist long after a site has become unsuitable for germination. There is high mortality among young plants after severe winters[4].

Our wildlife reserves

Displays of Scottish primrose can be found on our Hill of White Hamars Wildlife Reserve in Orkney, usually in May and June.

[2] Morris, J. (2009). *Primula scotica* survey in Caithness and Sutherland 2007-2008. Scottish Natural Heritage Commissioned Report No.312.
[3] Jackson, S. & Reynolds, P. 1986. Survey of *Primula scotica* in Orkney, 1985. Report to the Nature Conservancy Council.
[4] Bullard, E.R., Shearer, H.D.H., Day, J.D. & Crawford R.M.M. 1987. Survival and flowering of *Primula scotica* Hook. Journal of Ecology, 75, 589-602.

Threats

Inappropriate grazing

Too little grazing in an area allows more vigorous plant species to out-compete the Scottish primrose. Its loss at 75 locations in Caithness and Sutherland over recent years has been attributed to a lack of grazing at these sites. This happens particularly where fences have been erected which exclude sheep and cattle.

Where grazing is too heavy however, most notably during summer months when plants are in flower, populations of Scottish primroses can also suffer.

Agricultural intensification and land development

Agricultural intensification and land use changes such as tree planting or developments can result in Scottish primrose populations being lost.

Climate change

The Scottish primrose is sensitive to extremes of climate (winter storms and frost, and heat in summer) and populations could be reduced if weather patterns become more extreme through climate change[5]. It grows better during warmer years – producing more seed and seedlings.

Management

The Scottish primrose has a very narrow genetic base, making it less likely to be able to respond to changes in its habitat. The most suitable strategy for its conservation is the protection of its existing habitat which should be achieved by concentrating on just a few of its remaining sites, without compromising loss of genetic variation.

Management of known sites needs to concentrate on providing grazing over the autumn and winter months to maintain a short, open sward whilst removing grazing during the summer to allow the plants to flower and set seed.

Regular surveys should continue at, and adjacent to, current and historic sites. The seed is thought to be long-lived in the soil, so populations may re-establish sometime after the last plants have flowered in areas that used to have populations[6].

Current work

The Scottish Wildlife Trust's reserve at Hill of White Hamars has 23 populations of Scottish primrose, with over 2,000 plants. There is a management agreement with the tenant farmer at Loft and White Hamars

[5] Harris, R.A. & Jones, M. 1998. The Nature of Grazing, Farming with Flowers at Loft and the Hill of White Hamars. Management Advisory Note. The Scottish Wildlife Trust, Edinburgh.
[6] Morris, J. 2009. *Primula scotica* survey in Caithness and Sutherland 2007-2008. Scottish Natural Heritage Commissioned Report No.312.

farm who grazes sheep on fields with Scottish primroses only during the winter months, moving the flock to other grasslands in the summer. This arrangement is only viable with a financial subsidy from the Scottish Rural Development Programme.

The coastal grassland habitat that Scottish primrose grows in is a priority habitat for Plantlife Scotland. It has been identified as one of 165 Important Plant Areas in the UK which requires protection and management - the North Coast Important Plant Area. Plantlife Scotland have also held workshops and provided advice to land managers on the habitat and have a publication on management for coastal grasslands Coastal Grasslands: A management guide.

The plant is also found near Dounreay Nuclear Power Development on the north coast of Caithness on a coastal strip beyond the eastern perimeter of the site. A survey identified approximately 2,500 plants growing in an area zoned for development as a low-level waste facility. In 2011, plants were translocated approximately 100m further along the coast where other specimens are found. This area has been fenced off to provide a protected natural habitat for the primrose.

The Loft and White Hamars Grazing Project was set up in 1987 to develop patterns of grazing that would favour special plants, like the Scottish primrose, as well as safeguard species-rich maritime grassland and heath. The intention was to find an environmentally- sensitive way of using the natural growth of coastal grasslands and heaths, without any fertiliser or pesticide use, to produce a lamb and wool crop. This grazing strategy proved very successful for the Scottish primrose, producing grassland and heaths within which the primrose has been able to thrive despite periodic setbacks due to extreme weather conditions. The number of Scottish primrose plants increased from 659 to 3316 over a 10-year period. The project has now formally ended, but the reserve continues to be managed by targeted seasonal grazing. In 2009, spatial monitoring of three of the Scottish primrose populations was set up to evaluate how the species is prospering.

Wider context

The Scottish primrose is an endemic plant to Scotland and is of considerable interest to local residents, visiting botanists and tourists. If it is not conserved here it will become extinct.

The maritime heath and machair grasslands in the North of Scotland where Scottish primroses are found also contain many other rare and declining species worthy of conservation. As such, the Scottish primrose could act as an indicator species at some of these sites.

A repeat of the 2009 Scottish primrose survey in 2019 would be worthwhile.

Fast facts

- The Scottish primrose was the original emblem of the Scottish Wildlife Trust.
- It is the county flower of Caithness.
- It is championed in the Scottish Parliament by Liam McArthur MSP Scotlink - Species Champions.
- It is regarded by botanists as one of the most scarce and attractive plants in the world.
- It does not seem to be attractive to insects.

- It formerly had a wider distribution, occurring at inland sites; by 2007, only three of these remained in Caithness, the others having been lost as a result of agricultural change.
- It was first recorded in Sutherland in 1767.
- It is included in the Caithness and Sutherland Local Biodiversity Action Plans (LBAPs).

Version: Updated August 2018

Selected References

Morris, J. (2009). *Primula scotica* survey in Caithness and Sutherland 2007-2008. Scottish Natural Heritage Commissioned Report No.312.

This report details the findings of the survey of Scottish primrose *Primula scotica* undertaken in Caithness in July 2007 and Sutherland during August 2008.

• A total of 194 populations of *P. scotica* were found across Caithness and Sutherland

• All 50 sites where *P. scotica* had been recorded previously were surveyed. Populations of *P. scotica* were found at 42 of these sites

• Nineteen new populations were found

• Overall, 75 populations had been apparently lost.

• Of the 42 sites where *P. scotica* was found, five had <100 plants, twelve had 100-1000 plants, ten had 1,000-5,000 plants, seven had 5,000-10,000 plants and eight had 10000-100,000 plants.

• Estimates of *P. scotica* population size had either not changed or had increased at the majority of sites compared with previous surveys (64% unchanged or increased compared with 1995; 95% unchanged or increased compared with 1985).

• Local losses of *P. scotica* populations appeared to have occurred mainly due to under grazing leading to a rank sward within which *P. scotica* could not compete against

• Most of the apparent losses of *P. scotica* in Caithness had occurred on the east coast, with no cliff-top populations found south of Wick. Most of the losses of *P. scotica* in Sutherland were on the coastal strip between Tongue and Bettyhill.

• An average of 28% of *P. scotica* had flowered during the year that they were surveyed.

• *P. scotica* was found in areas grazed by cattle, sheep and rabbits and was not consistently associated with any particular species of grazer.

Bullard, E.R., Shearer, H.D.H., Day, J.D. and Crawford R.M.M. (1987). Survival and flowering of *Primula scotica* Hook. Journal of Ecology, 75, 589-602.

Combines observations over sixteen years in Orkney with data from other sites on the north coast of Scotland. They look at variations in flowering frequency, plant longevity and seedling establishment.

Cowie, N.R., Armitage, C. and Gill, J. (1994). Pilot resurvey of the Scottish primrose *Primula scotica* on the North Coast of Scotland. Scottish Natural Heritage Report.

Cowie, N.R., Harvey, M.L., Legg, C.L. and Sydes, C. (1998). A sample survey of *Primula scotica* in Caithness and Sutherland. Scottish Natural Heritage Research, Survey and Monitoring Report, No. 34.

Farrell, L. (1989). The status of the Scottish primrose (*Primula scotica* Hook) in Britain. CSD Note 46.

Harris, R.A. and Jones, M. (1998). The Nature of Grazing, Farming with Flowers at Loft and the Hill of White Hamars. Management Advisory Note. The Scottish Wildlife Trust, Edinburgh.

Jackson, S. & Reynolds, P. (1986). Survey of *Primula scotica* in Orkney, 1985. Report to the Nature Conservancy Council.

Macdonald, A., Stevens, P., Armstrong, H., Immirzi, P. and Reynolds P. (1998). A Guide to Upland Habitats. Surveying Land Management Impacts. Vol 2. The Field Guide. Scottish Natural Heritage, Perth, Scotland.

Plantlife (2014) Coastal Grasslands: a management guide.

SNH. (1997). *Primula scotica* pilot survey Red Point Coast. SNH, Golspie files.

White, S. (1990). The status of *Primula scotica* populations in Caithness and Sutherland in July 1990. Report to Nature Conservancy Council.

Glover, B.J. and Abbot, R.J. (1995). Low genetic diversity in the Scottish endemic *Primula scotica* Hook. *New Phytologist* 129: 147-153

A survey of genetic variability within the species was conducted on five populations from Orkney and nine from the Scottish mainland. Isozyme analysis revealed variation between individuals at only one of 15 enzyme encoding loci examined, while a survey of DNA sequence variation revealed no genetic diversity either within or between a subsample of four populations surveyed.

The almost total lack of variability within *Primula scotica* revealed by this study has implications for its conservation. In the long term the species may simply be unable to respond to environmental change, while in the short term reintroduction into novel habitats is unlikely to succeed, unless extremely similar sites can be found to those presently occupied. However, if current sites are protected the species may survive for the foreseeable future. Increased mortality in severe winters need not concern the conservationist, as there is no variability to be lost and the population size is likely to return to normal, since the species seems to be so well adapted to its current environment. Protection of machair in the north of Scotland is a desirable aim for its own sake, as it is an unusual and rapidly declining type of community, containing many other interesting species.