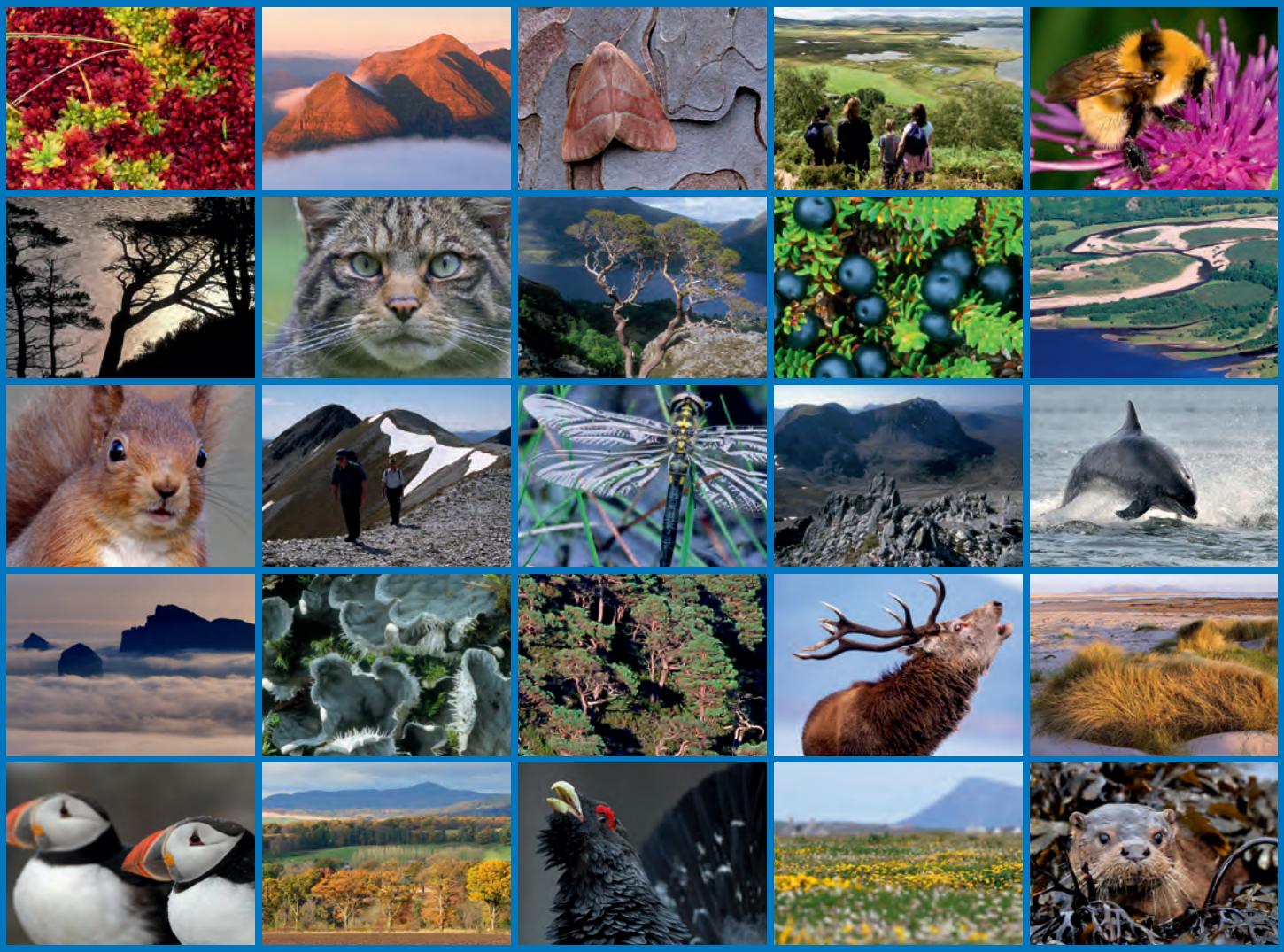
Scottish Natural Heritage
Commissioned Report No. 801

An assessment of herbivore impacts on subalpine wet heath within Ben Vorlich Site of Special Scientific Interest



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COMMISSIONED REPORT

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An assessment of herbivore impacts on subalpine wet heath within Ben Vorlich Site of Special Scientific Interest

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COMMISSIONED REPORT

Summary

An assessment of herbivore impacts on subalpine wet heath within Ben Vorlich Site of Special Scientific Interest

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Year of publication: 2015

Keywords

Ben Vorlich SSSI; herbivore impacts; subalpine dry heath.

Background

This report details the results of the herbivore impact assessment undertaken in 2014 at Ben Vorlich SSSI. This is a repeat of a similar assessment carried out by A. Headley on behalf of Scottish Natural Heritage in 2008. The repeat survey was carried out as sheep numbers were known to have decreased and the current trend in the site was unclear. It is hoped that the findings of this assessment can be used to inform future management decisions on the site.

Main findings

- A survey of herbivore impacts was carried out on wet heath habitat on Ben Vorlich SSSI between May and August 2014.
- 42 sample plots were visited. In each sample plot the indicators of current grazing, trampling and dunging impacts were assessed as well as indicators of trends in the impacts using the methods of MacDonald *et al*. (1998). Overall herbivore impact classes were assigned to each sample plot for each of the indicators scored.
- For the vast majority (74 %) of the overall herbivore impacts for subalpine wet heath are in the low category (Appendix 3). Stuckendroin has the higher percentage of the overall herbivore impacts as low (84%) with only 16% being in the moderate assessment category. At Inveruglas the majority of the herbivore assessments were still low (61%) but a scattering of moderate/low and moderate assessments were also recorded.
- The overall trend across the site was one of decreasing grazing. 56% of the samples indicated that grazing is currently decreasing on the site, the majority of the Stuckendroin samples (71%) were classified as such. Unfortunately at both Stuckendroin and Inveruglas, 26% of the samples were found to have chronic high grazing trend, primarily due to the impact of deer grazing on the noses of the ridges extending towards Loch Lomond.
- Sheep were considered to be the principal herbivore in 2008. In 2014 red deer were found to be the principle herbivore with only some sheep impacts around the slopes above Coire na Baintighearna. There may well be roe deer in the area, but evidence of this species was not found during the 2014 survey.

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Nomenclature

The scientific names of vascular plants follows that of Stace (1997), of mosses follows that of Smith (2004) and the nomenclature for plant communities are those in Rodwell (1991, 1992). The equivalent English names for the scientific names of the vascular plants used in the text are given in Appendix 2.

1. SITE BACKGROUND

1.1 Designations

Ben Vorlich Site of Special Scientific Interest (SSSI) was notified in 1983 mainly for three montane habitats: alpine flush, subalpine wet heaths and tall herb ledge communities. The upland birds, mammals and invertebrates provide additional interest to the site.

1.2 Site description

Ben Vorlich SSSI is an upland site 15 km south-west of Crianlarich in the Western Highlands within the administrative district of Argyll & Bute District Council. It is centred on the 943 m high mountain of Ben Vorlich at grid reference NN 296123 between the north-western shore of Loch Lomond and Loch Sloy and covers an area of 779 ha. The rocks are composed of metamorphosed marine sediments of the Dalradian series and where these are particularly calcareous and ground-waters issue to the surface, the more base-demanding arctic-alpine plants of the alpine flushes tend to occur.

1.3 Survey and monitoring history

The condition of the listed nature conservation interests within designated sites across Scotland are assessed by the ongoing Site Condition Monitoring programme. This was first carried out in 2005/6 at Ben Vorlich SSSI for the three designated habitats using the Common Standards Monitoring methods for upland habitats. The three habitats present, alpine flush, tall herb ledge communities and sub-alpine wet heath were found to be in unfavourable and declining condition (Acton & O'Hanrahan, 2007). The factor that was identified as contributing to the failure of the condition assessments was over-grazing. That survey, however, did not provide sufficient detail to provide a baseline of the nature and extent of adverse herbivore impacts against which future changes can be monitored.

An assessment of herbivores impacts on notified upland features on the site was undertaken in 2008 (Headley, 2008). This indicated that all 3 of the notified upland habitats across the site were being heavily grazed by sheep.

Following the 2008 survey, large areas of the west Loch Lomond catchment were destocked of sheep, including the Stuckendroin management unit. It is thought that the remaining sheep on the site have spread out across Coire na Baintighearna.

In 2012 site condition monitoring was repeated for the tall herb ledge communities and a quick site check was made of the alpine flushes. It was considered that although the features were still in an unfavourable condition they were showing signs of recovery due to the recent changes in management.

In 2014, in tandem with this survey, a site condition monitoring assessment was carried out of the sub-alpine wet heath feature. It was found to be in an unfavourable recovering condition. It was however only a marginal case for assigning a recovering status. The assessment suggests that the once heavy grazing by sheep has been reduced and the heathland started to recover. Unfortunately deer grazing pressure has now started to increase. This herbivore impact assessment looks at the impact of herbivores on the heathland community in more detail.

1.4 Aims

SNH has undertaken this survey with the key aim to obtain an up to date assessment of the relative nature and extent of herbivore impacts against which future trends can be gauged.

This assessment was carried out on the subalpine wet heath feature as it is probably the most widespread of the three notified habitats within the SSSI. A further site condition assessment of the wet heath was also carried out in tandem with the herbivore impact assessment.

2. METHODS

2.1 Sample design

During the 2008 HIA 46 sample plots for wet heath were identified opportunistically as the surveyor progressed across the site, whilst ensuring a reasonably wide distribution of samples were taken across each management unit. Random samples were not used due to the lack of baseline data on the distribution of wet heath on the site.

During the 2014 HIA 42 of the 46 wet heath points identified during the 2008 survey were revisited. 4 points were not revisited due to them being located in an area with very little heath at the most remote part of the site. That area is also known to be the area richest in the springs and flush feature of the site and any management changes within that area should be targeted at the safeguard of than feature rather than the wet heath.

2.2 Field survey

The field surveyors chose the most economical and safest route to reach each of the random waypoints using a map and a hand held Geographical Positioning System (GPS) receiver. A 20m radius of the given National Grid reference was searched for wet heath habitat and if present it was assessed in a 2m x 2m area (quadrat).

The impacts of herbivores were assessed using the same targets as those used for wet heath in the 2008 survey. The small-scale field indicators for grazing and trampling and trend indicators described in MacDonald *et al*. (1998) at each of the waypoints. For the wet heath a hybrid of most of the blanket bog indicators and some of the dwarf-shrub indicators were used to assess the herbivore impacts on this habitat. The indicators used to assess the levels of grazing, trampling, dunging and the trends in herbivore impacts are given in Appendix 1.

Where possible some of the indicators were quantified, such as estimating the proportion of long shoots of heather and bilberry grazed, or the area of disturbed bare ground or the height of the sward taken from an average of 10 points (handfuls) within the sample plot (see Appendix 1).

The indicators were assessed in 2m x 2m quadrats or sample plots for the vast majority of the indicators. However, for the density of dung pellets a larger area is required to obtain a representative count and nominal areas of approximately 10m x 10m centred on the smaller sample plot were used. A photograph of the vegetation within each plot was taken with a digital camera. These are stored in SNH's Photolink library.

All targets were assessed at each waypoint sample location when possible. For some indicators the species concerned were not present and therefore a 'Not Present' score was given (NP in the results tables).

2.3 Data analysis

As with the 2008 survey, overall herbivore impact scores for an individual sample plot were assigned by taking the median value for all of the indicators that could be placed in the six classes ranked in the following order: Very High, High, High/Moderate, Moderate, Moderate/Low and Low. Where there was an even number of indicator scores and the median score straddled two classes a judgement was made on the basis of the balance of classes above and below the median point. For the trend indicators the class with the highest frequency, i.e. modal class, was taken as the overall trend in herbivore impacts.

3. RESULTS

Field survey data is shown in appendix 2.

Summary table of small scale indicators of current grazing and trampling impacts is shown in appendix 3.

Summary table of field indicators of trends in browsing and trampling is shown in appendix 4.

3.1 Overall sampling intensity

The field survey was carried out on 14 May, 28 May and 18th August 2014 by Hazel White and Helen Doherty taking 5 man days to complete.

The herbivore impacts were assessed a total of 42 sample plots for the subalpine wet heath habitat across both management units. 18 samples were surveyed within the Inveruglas (IWH) management unit and 24 samples from the Stuckendroin (SWH) management unit.

3.2 Current herbivore impacts

The median value for small-scale indicators of current trampling and grazing impacts was calculated and is summarised in table 1 below.

Table 1. The number of sample plots with different overall herbivore impact scores for the subalpine wet heath habitat across the two management units within the Ben Vorlich SSSI. 2014 Results

Management unit	Current overall herbivore impact score					Total
	Low	Moderate/ Low	Moderate	High/ Moderate	High	
Inveruglas	11	2	5	0	0	18
Stuckendroin	20	0	4	0	0	24
All	31	2	9	0	0	42

For the vast majority (74 %) of the overall herbivore impacts for subalpine wet heath are in the low category (Appendix 3). Stuckendroin has the higher percentage of the overall herbivore impacts as low (84%) with only 16% being in the moderate assessment category. At Inveruglas the majority of the herbivore assessments were still low (61%) but a scattering of moderate/low and moderate assessments were also recorded. Low levels of trampling, hoof prints and bare peat all confirm that levels of herbivore activity were generally low across the sub-alpine wet heath feature. A map showing the distribution of overall herbivore impact score is shown in appendix 5.1 and a map showing the distribution of the overall trend indicator score is shown in appendix 5.2. The maps show that for both the impact and trend scores the areas with the highest impacts scores (mostly moderate) and the highest trend indicators (chronic high) are the southern noses of the ridges of both the Little Hills and the south-south eastern ridge from Ben Vorlich.

Data for each of the herbivore impact classes for each of the attributes measured for the small scale indicators of current grazing and trampling, by management unit is shown in appendix 3. This data is shown graphically on page 7. All targets were assessed as mostly low with some medium and only a very few high impact scores. Indicators tended to be only slightly higher for the Inveruglas management unit than the Stuckendroin management.

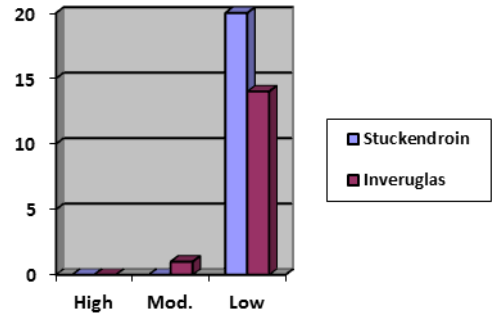
No surprising or inconsistent results were found. Particularly low levels of trampling and hoof prints were found and this is consistent with the other variables being assessed as low

to moderate due to the heath being in the drier areas of the site which are less susceptible to physical disturbance such as uprooting and hoof printing. Low to moderate levels of flowering of Eriophorum, Calluna and Vaccinium may be a result of the early season survey dates of 2 of the 3 visits and the relatively high altitude delaying flowering of these species. The amount of dung present and the degree of browsing of sub shrubs suggests that herbivore numbers in the area are low to moderate.

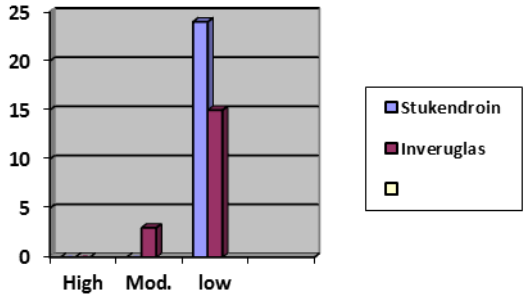
Deer were found to be the main grazer on the site although sheep grazing was locally more prevalent on the slopes of Coire na Baintighearna

Appendix 5 contains maps showing the distribution of the assessed variables for grazing impact scores.

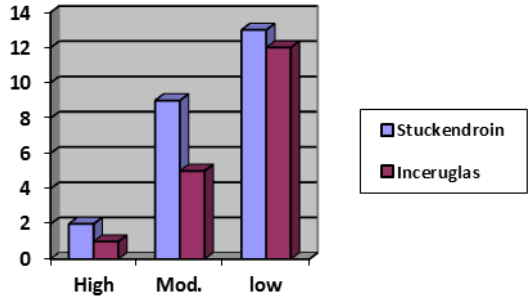
Figure 1. Charts showing the distribution by management unit of high, medium and low herbivore impact scores.



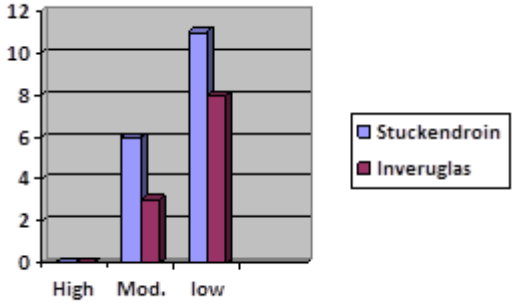
Trampling of Sphagnum moss hummocks and lawns at sample points



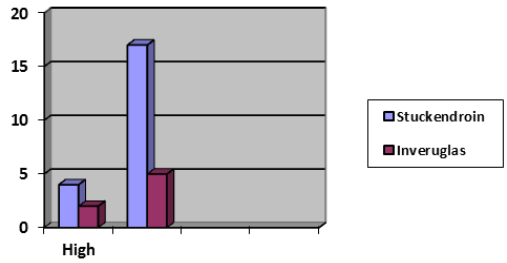
Abundance of hoof prints in bare peat at sample points



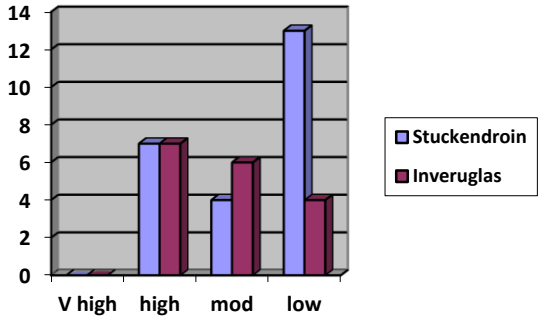
Extent of ground covered by bryophytes and/or lichens among and between dwarf shrubs, sedges and grass plants



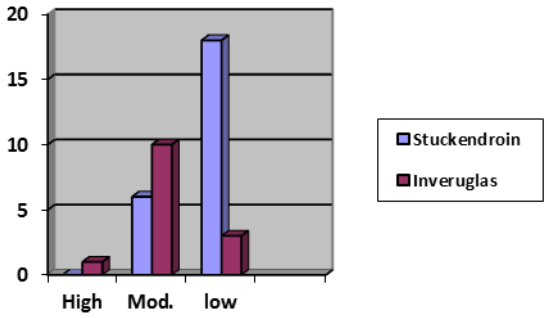
Amount of flowering of *Eriophorum* sp.



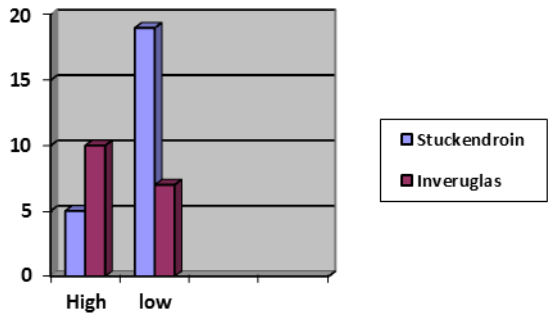
Signs of browsing on *Arctostaphylos*, *Empetrium*, *Calluna*, *Erica* or *Vaccinium* species (right hand column = low)



The average proportion of long-shoots of *Calluna* and/or *Vaccinium* showing signs of being browsed



Amount of flowering or fruit on Calluna and/or *Vaccinium* spp.



Amount of herbivore dung present

3.3 Trends in herbivore impacts

The overall trend for the site was one of decreasing grazing. Table 2 below summarises the trend data recorded. Raw data is summarised on appendix 2

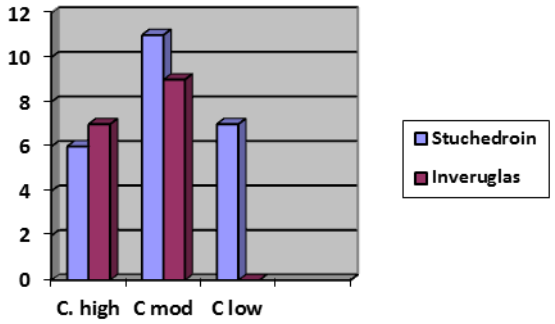
Table 2. The number of sample plots with different trends for the subalpine wet heath feature across the two management units within the Ben Vorlich SSSI.

2014 results

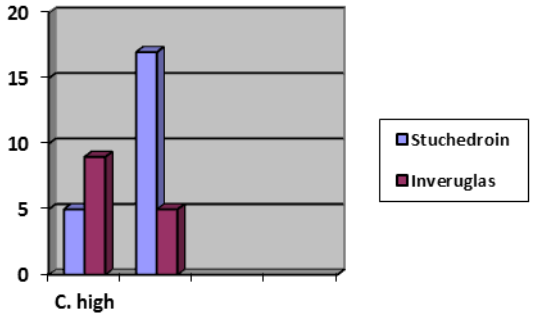
Management Unit	Chronic High	Chronic Moderate	Increasing	Chronic Low	Decreasing
Inveruglas	6	1	0	5	6
Stuckendroin	5	2	0	0	17
All	11	3	0	5	23

The individual indicators of trend compared to current impacts are less clear. Graphs showing the results for individual trend indicators are shown below. The trend indicators were decreasing for height of dwarf shrubs relative to graminoids, changes in growth form within the structure of dwarf shrub bushes and presence of species more typical of drier grassland. For growth form of Calluna and/or Vaccinium and abundance of Juncus squarrosus and its growth form relative to other vegetation results were more evenly split between chronic high, chronic moderate and chronic low. The extreme topiary forms of Calluna and Vaccinium are considered strong and reliable indicators of chronically high levels of browsing (MacDonald *et al*., 1998) but at Ben Vorlich may be taking longer to recover from the previously reported high levels of browsing than other factors. Often Calluna was found to be absent from the wet heath when it would be expected to be present, possibly also as a result of previously high grazing levels. Thus the assessment that there have been decreasing levels of grazing in the subalpine wet heath on Ben Vorlich is considered to be fairly robust.

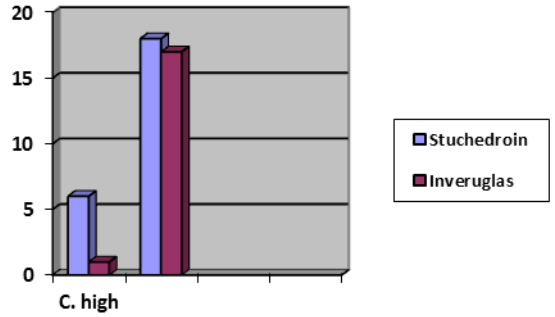
Figure 2: Charts showing the distribution by management unit of high, medium and low herbivore trend impact score



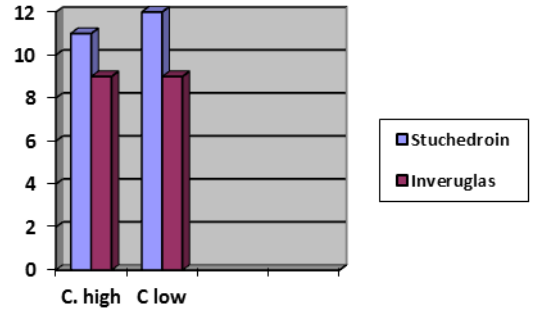
Growth forms of *Calluna* and/or *Vaccinium*



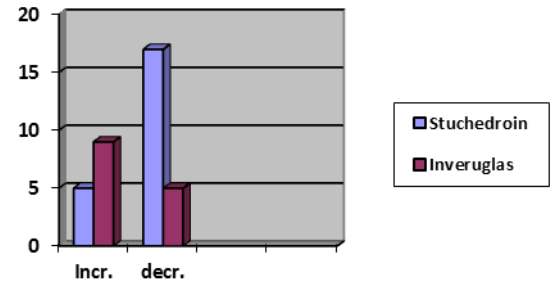
Presence of species more typical of drier grassland such as *Agrostis canina*, *Agrostis capillaris*, *Anthoxanthum odoratum*, *Deschampsia flexuosa*, *Festuca ovina* and *Nardus stricta*



Height and cover of dwarf shrubs relative to graminoids



Abundance of *Juncus squarrosus* and its growth relative to other vegetation



Changes in growth form recorded within the structure of dwarf shrub bushes

Maps showing the distribution of the trend classes for the individual variables are shown in Appendix 5. As with the overall assessment, the distribution the main areas of concern, those assessed as chronic high, are the ridge noses of the Little Hills and to a lesser extent the ridge from Ben Vorlich.

4. DISCUSSION – COMPARISON WITH 2008 HERBIVORE IMPACT SURVEY OF BEN VORLICH

Data from the 2008 and 2012 surveys is summarised below. The 2008 assessment found that most of the site was assessed as high herbivore impacts. A comparison with the 2014 data indicates that the overall situation at Ben Vorlich is now much improved with all the averaging of the assessment waypoint data coming out as low to moderate. The trend of change on the site is however much less clear. In 2008 the situation was clear with the majority of the samples with a chronic high trend. In 2014 the trend was a little more mixed with 55% of samples showing a decreasing trend, 26% remaining chronic high and the remainder either chronic moderate or chronic low. This may be because some variables are taking more time than others to respond to the grazing changes or it could be linked to the change from sheep to deer as the main herbivores present.

Table 3. The number of sample plots with current overall herbivore impact scores in each category for the subalpine wet heath feature across the two management units within the Ben Vorlich SSSI for 2008 and 2014

2008 results

Management unit	Current overall herbivore impact score					Total
	Low	Moderate/ Low	Moderate	High/ Moderate	High	
Inveruglas	0	1	6	5	7	19
Stuckendroin	0	3	15	1	8	27
All	0	4	21	6	15	46

2014 results

Management unit	Current overall herbivore impact score					Total
	Low	Moderate/ Low	Moderate	High/ Moderate	High	
Inveruglas	11	2	5	0	0	18
Stuckendroin	20	0	4	0	0	24
All	31	2	9	0	0	42

Table 4. The number of sample plots with current overall trend scores in each category for the subalpine wet heath feature across the two management units within the Ben Vorlich SSSI for 2008 and 2014

2008 results

Management Unit	Chronic High	Chronic Moderate	Chronic Low	No clear trend
Inveruglas	18	0	1	0
Stuckendroin	23	1	0	3
All	41	1	1	3

2014 results

Management Unit	Chronic High	Chronic Moderate	Increasing	Chronic Low	Decreasing
Inveruglas	6	1	0	5	6
Stuckendroin	5	2	0	0	17
All	11	3	0	5	23

5. CONCLUSIONS

The overall herbivore impacts on sub-alpine wet heath feature have been shown to be relatively uniformly low across the whole site. The exception to this is the noses of the ridges running east from the Little Hills and South east of Ben Vorlich. There are no major differences in the levels of herbivore impact between the two management units.

Sheep were considered to be the principal herbivore in 2008. In 2014 red deer were found to be the principle herbivore with only some sheep impacts around the slopes above Coire na Baintighearna. There may well be roe deer in the area, but this animal is usually present at low densities and is likely to occur on the lowermost slopes of Ben Vorlich and therefore outside the SSSI as it is strongly associated with woodland.

There is a very low cover of dwarf-shrubs across the whole of the site, especially in the subalpine wet heath. This is almost certainly due to a prolonged and high level of grazing on the hill by sheep. It is expected that over time, now that grazing has been reduced, the abundance of sub shrubs should increase.

The balance between sheep, and deer grazing on the site needs to be carefully managed as the site is still in a vulnerable condition and the balance of grazing species appears to be in a state of fluctuation. Management therefore needs to be regularly reviewed.

Red deer numbers appear to have increasing on the site, and anecdotally along all of the North West side of Loch Lomond. A deer count and a review of deer management both on the site and as part of a larger collaborative group with adjacent estates is recommended.

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