

Molland Moor

1. Introduction

Natural England (NE) and its predecessors have carried out a series of monitoring programmes on many upland sites in England that contain Priority Habitats, including dry and wet heath, blanket bog and calcareous grassland. These sites have been managed under agri-environment schemes for up to two decades or more, and some were formerly also subject to grazing restrictions under Environmental Cross Compliance (ECC) regulations. Monitoring focussed initially on the condition of heather (*Calluna vulgaris*) in relation to grazing pressure, and latterly also on the overall condition of the vegetation across the range of habitats present on a site.

The aim of this project was to re-survey a selection of these sites using standardised methods, and to provide a series of individual site reports describing their current and changing habitat condition, along with a separate overview of the findings from the complete set of sites. Data from the surveys have also been provided to NE to allow more detailed examination of individual sites to help guide local management inputs.

Each site comprised a whole moorland grazing unit and encompassed a range of vegetation types. A range of variables was recorded at 100 randomly located sample points in each site. Variables to be recorded were agreed with NE prior to the survey, to assess heather grazing and the condition of key habitats. The methodology was based on a modified version of the NE overgrazing surveillance methodology (including laboratory assessment of a heather Grazing Index) and the Common Standards Monitoring (CSM) Guidance for Upland Habitats. Full details of the project objectives and methodology are given in the main overview report. [Defra, UK - Science Search](#)

The Molland Moor site was surveyed during 9 to 10 April 2014. Results of the survey are presented in a standard format in the following sections. Management information (particularly grazing) is also summarised from reports provided by NE. An assessment is then made of change in vegetation since the previous surveys and this is considered in the context of current and past management practices.

2. Overview

2.1 General description

Molland Moor is located on Exmoor and covers 706 ha in South Exmoor SSSI and Exmoor heaths SAC. Approximately half of the site is heather heath (27% of sample points in 2014; Figure 1) or fragmented heath (27%), in which the majority of heather is in the mature (41% of sample points where it was present) or building (29%) growth stage, but with also a notable amount in the degenerate (20%) and pioneer (10%) stages. There are occasional areas of recent and older burns. *Molinia caerulea* was the most commonly recorded dominant graminoid with other graminoid species only dominant occasionally (Figure 3h). There are occasional areas of western heath on combe sides and as isolated stands in the heather heath. Wet heath is rare on the site and dominated by *M. caerulea*.

Approximately one third of the site is rough acid grassland (17% of sample locations), bent-fescue grassland (10%) and mesotrophic grassland (5%). There is also a complex of mires in the far northern part of the site that is in places vegetatively characteristic of NVC M20 *Eriophorum vaginatum* community. However, this may have been soligenous in nature as the vicinity also includes flush, fen & swamp vegetation types. The *Eriophorum* dominated community is generally

relatively *Sphagnum*-rich, but largely degraded in many locations. Flush, fen & swamp is also *Sphagnum*-rich but otherwise species-poor and with some species indicative of nutrient enrichment.

2.2 Site management

The site entered an agreement in the Exmoor Environmentally Sensitive Area (ESA) in 1993 under Tier 1 (part 5). Under this agreement the maximum stocking levels were 0.225 LU ha⁻¹ (equivalent to 1.5 ewes and followers or 0.225 suckler cows and their calves ha⁻¹), with no grazing by cattle during 1 November to 15 April and a maximum of 1 ewe ha⁻¹ in that period. Ponies could also be grazed with prior approval and there were restrictions on supplementary feeding. The actual stocking rates on the site at that time are given in Table 1. Prior to entering the ESA agreement, stocking levels were considerably higher with a large autumn peak of sheep and overwintering of cattle.

Table 1. Mean stocking rates (LU ha⁻¹) prior to and during the ESA agreement.

| | Annual | Summer (May – October) | Winter (November – April) |
|--------|--------|---------------------------|------------------------------|
| 1992-3 | 0.12 | 0.19 | 0.05 |
| 1995-6 | 0.05 | 0.10 | 0.01 |

The site entered a Higher Level Stewardship (HLS) agreement in 2009, which specified two alternative detailed stocking calendars for sheep, cattle and equines, depending on the number of ponies included. The stocking rates (if 30 ponies were present) were 0.11 LU ha⁻¹ in summer (May to September inclusive) and 0.04 LU ha⁻¹ (October to April) or (if 60 ponies were present) 0.11 LU ha⁻¹ and 0.055 LU ha⁻¹ respectively¹. There is also a detailed burning plan, requiring 20 ha to be burnt annually (c. 3% of the total area of the site), along with bracken and European gorse control programmes.

The site was subjected to surveys of heather condition in 1993 and 1996, under the ESA monitoring programme². These surveys focussed on grazing pressure on heather, deriving a heather grazing index (GI) from shoots collected in the field, from 140 quadrats in each survey, from five transects between pairs of random points. Other heather variables, sward height, the presence of livestock droppings and individual species abundance (on the Domin scale), were also recorded. In ESA monitoring surveys the GI was converted to a measure of Biomass Utilisation (BU) using a mathematical function, although later Surveillance surveys on other sites and in the 2014 survey have reverted to the more objective measure of GI.

2.3 Condition and grazing pressure 2014

The mean GI was moderate in the fragmented heath (20%) but relatively low in the heather heath (10%). Across the site as a whole only 12% of the samples did not meet the CSM GI target of less than 33%, above which level grazing is likely to be damaging (Figure 2, Table 2, Map 1). There was also a low frequency of heather heavily grazed features in the fragmented heath (Figure 3d, Map 2) and occasional detached vegetation and heather stems across the site (Figure 3g). Cattle/pony droppings were quite widely distributed, with main concentrations in the more palatable vegetation (bent-fescue grassland and mesotrophic grassland) and also in fragmented heath, where the mean graminoid height was only 6 cm. The mean graminoid sward height at 29% of points where

¹ Note that LU equivalents have varied among different schemes.

² An additional survey was also carried out in 2004 but the GI figures were considered unreliable and hence the results have not been published though data on other variables is considered reliable and has been included in the section on change below.

measurements could be made, or 22% of points overall indicated that selective heavy grazing was likely in these areas (Map 2).

There was evidence of small amount of recent burning in heather heath and fragmented heath (Figure 3e). There was also a lot of heather beetle damage, at approximately one third of sample points where heather was present (Figure 3d).

The dry heath habitat just failed to meet the CSM condition threshold (targets to be passed at 90% of sample points) for levels of browsing on dwarf shrubs, with the target met at 81% of points. It was well below the threshold for indicator species cover (14% of samples passed the $\geq 50\%$ cover target), where the measure of dwarf shrub cover is taken as indicator species cover - a reasonable assumption for Molland Common as no *Racomitrium lanuginosum* was recorded, but only failed the indicator species frequency threshold by a small margin (88% of sample points meeting the target). The GI figures are likely to be an underestimate because the site is also grazed by cattle and/or ponies, so the indications are that grazing levels may be higher than is desirable. Despite this, the dry heath was considered to be in reasonable condition. The smaller areas of mires and wet heath appear to be degraded, which is probably related to past grazing and burning practices.

2.4 Change since previous surveys

Previous surveys of the site as part of the ESA monitoring programme used a different sampling regime from that in 2014 (with samples at random points along random transects) so formal analysis of change was not possible. However, some general comparisons could be made. Between 1993 and 1996, the GI had declined from 20% to 12% and heather growth stages had shifted from predominantly mature or degenerate to building and pioneer (but with an increase in mature again in 2004). The 1996 GI is comparable to the 2014 levels of 14% across the site and 10% in heather heath, but heather appeared to have shifted more towards the mature growth phase, which might also be related to burning management. Mean height of heather was 23 cm in both 1993 and 1996, and 31 cm in 2004, so it might have increased slightly since then, at least in the heather heath (34 cm in 2014). Heather cover in the heather heath in 2014 (mean 29%) was similar to that in 1993 (34%) and 1996 (33%) and above that in 2004 (25%). Burning appeared to be at a slightly lower level to that in 1993 (10% in 1993 and currently 5% in fragmented heath and 8% in heather heath). Mean graminoid sward height (6 cm in fragmented heath and 7cm in heather heath) was considerably shorter than in 2004 (14 cm overall, though it was not measured in 1993 and 1996). An increase in bracken frequency and cover was recorded between 1993 and 2004 but this species was not specifically recorded in the present resurvey (as only indicator species were recorded) although the CSM target (<10% cover) was passed for dry heath at the whole feature scale.

Management under agri-environment agreements appears to have been beneficial to the dry heath habitat since 1993 although there were some indications that grazing levels may still be having some impact on heather. The extent of burning on this habitat appeared to be within the recommended frequency under the HLS agreement. The mire habitats have been damaged by previous management (probably grazing and burning) and have not yet recovered.

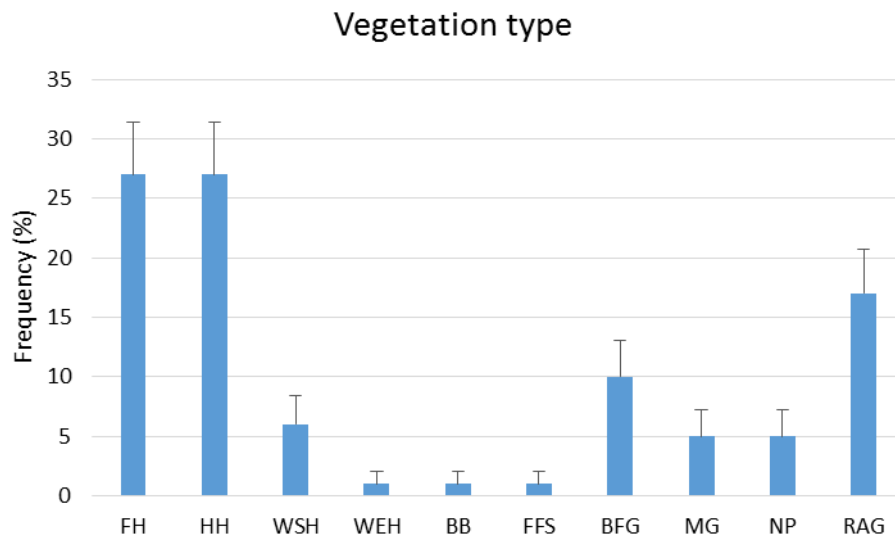


Figure 1. Frequency of vegetation types across the site in 2014. Bars are standard deviations. FH – fragmented heath; HH – heather heath; WSH – western heath; WEH – wet heath; BB – blanket bog; FFS – flush, fen, & swamp; BFG – bent-fescue grassland; MG – mesotrophic grassland; NP – non-productive; RAG – rough acid grassland.

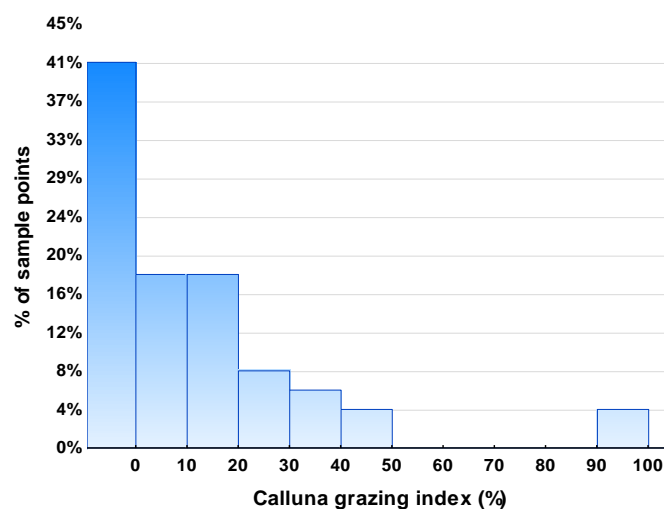


Figure 2. Frequency distribution of heather Grazing Index from sample points containing heather at whole site level in 2014.

Table 2. Heather Grazing Index at site level and by target vegetation type in 2014 (mean \pm standard deviation; *n* is number of sample points with heather stems).

| | Overall (<i>n</i> = 49) | Fragmented Heath (<i>n</i> = 20) | Heather Heath (<i>n</i> = 24) |
|----------------------|-----------------------------|--------------------------------------|-----------------------------------|
| Grazing Index | 14.1 \pm 22.12 | 20.1 \pm 29.80 | 10.2 \pm 13.55 |
| Samples \geq 33.3% | 12.2% | 15.0% | 8.3% |
| Samples \geq 66.6% | 4.1% | 10.0% | 0.0% |

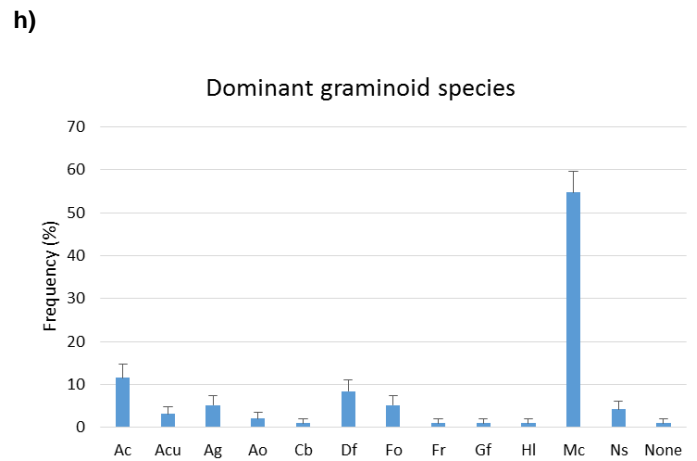
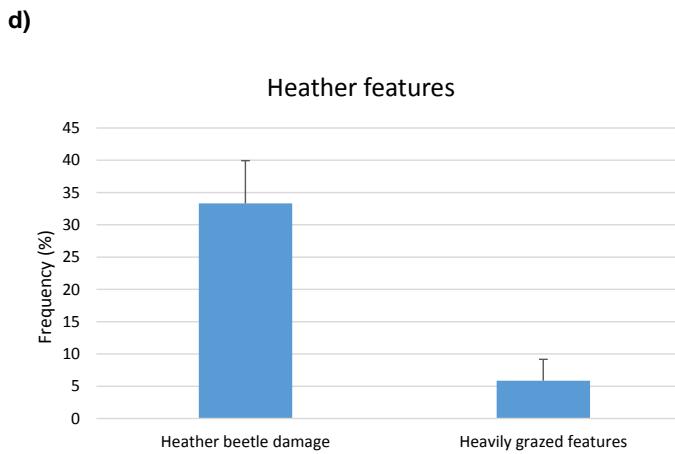
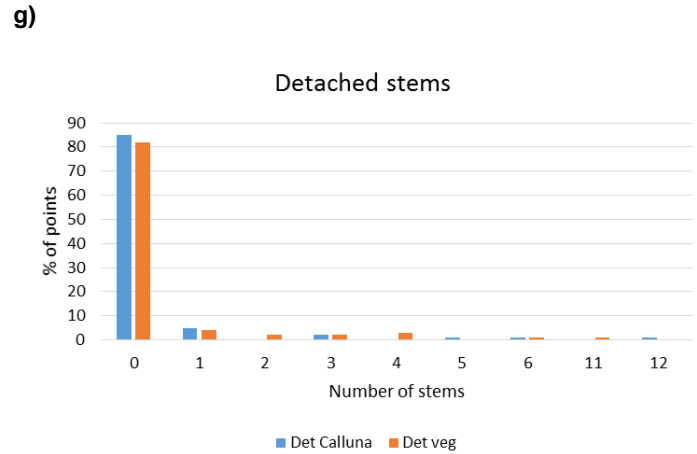
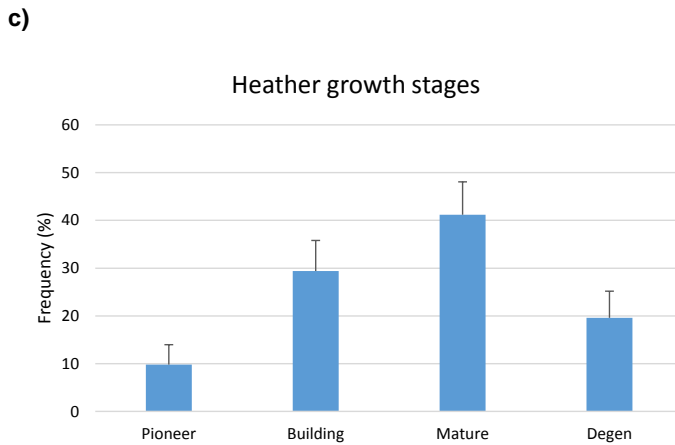
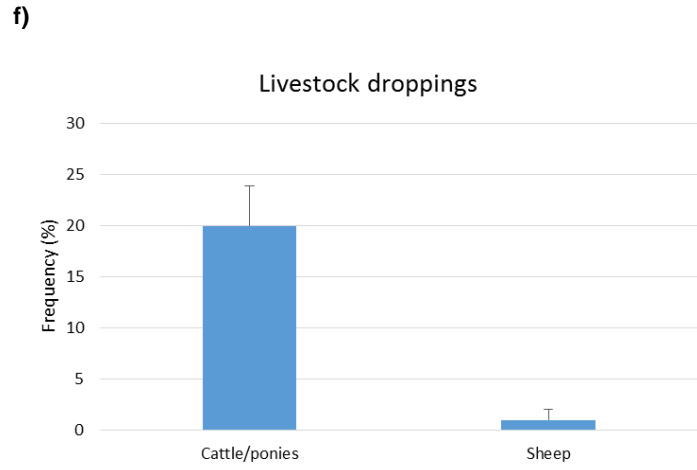
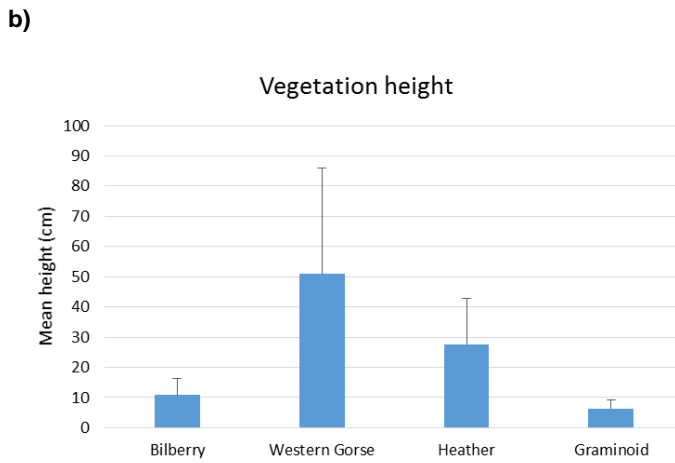
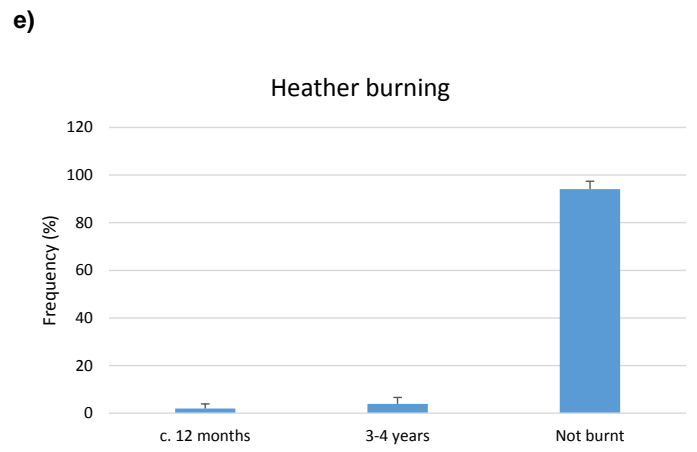
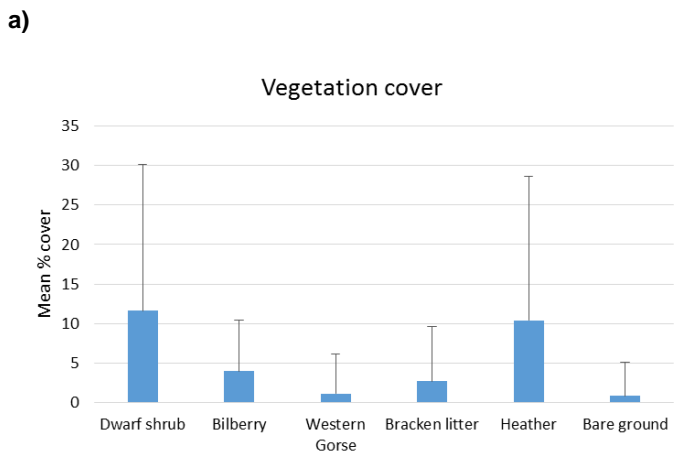


Figure 3. Surveillance variables at whole site level in 2014 (bars are standard deviations).

3. Overgrazing surveillance variables 2014

| Category | Variable | Fragmented Heath (<i>n</i> = 27) | | | Heather Heath (<i>n</i> = 27) | | |
|-----------------------|---------------------------------------|-----------------------------------|------|----------|--------------------------------|------|----------|
| | | Mean | SD | <i>n</i> | Mean | SD | <i>n</i> |
| Peat | Peat depth (cm) | 12 | 5.4 | 26 | 12 | 4.4 | 27 |
| Vegetation cover | Dwarf shrub cover (%) | 5 | 7.2 | 27 | 29 | 21.8 | 27 |
| | Bilberry cover (%) | 4 | 7.0 | 27 | 7 | 7.9 | 27 |
| | Western Gorse cover (%) | 0 | 1.7 | 27 | 0 | 0.0 | 27 |
| | Bracken litter cover (%) | 2 | 6.8 | 27 | 3 | 6.9 | 27 |
| | Calluna cover (%) | 4 | 7.2 | 27 | 29 | 21.7 | 27 |
| | Bare ground (%) | 0 | 1.4 | 27 | 0 | 0.2 | 27 |
| Vegetation height | Bilberry height (cm) | 10 | 3.3 | 20 | 12 | 6.8 | 24 |
| | Western Gorse height (cm) | 13 | 2.9 | 3 | 0 | 0.0 | 0 |
| | Calluna height (cm) | 20 | 12.3 | 20 | 34 | 15.0 | 25 |
| | Graminoid height (cm) | 6 | 2.4 | 19 | 7 | 2.9 | 21 |
| Heather growth stages | Pioneer (% of points) | 20 | 8.9 | 20 | 0 | 0.0 | 25 |
| | Building (% of points) | 40 | 11.0 | 20 | 24 | 8.5 | 25 |
| | Mature (% of points) | 25 | 9.7 | 20 | 56 | 9.9 | 25 |
| | Degenerate (% of points) | 15 | 8.0 | 20 | 20 | 8.0 | 25 |
| Heather features | Heather beetle damage (% of points) | 30 | 10.2 | 20 | 44 | 9.9 | 25 |
| | Heavily grazed features (% of points) | 10 | 6.7 | 20 | 0 | 0.0 | 25 |
| Heather burning | Burnt (c. 12 months) (% of points) | 0 | 0.0 | 20 | 4 | 3.9 | 25 |
| | Burnt (3-4 years) (% of points) | 5 | 4.9 | 20 | 4 | 3.9 | 25 |
| Droppings | Cattle / ponies (% of points) | 19 | 7.5 | 27 | 11 | 6.0 | 27 |
| | Sheep (% of points) | 0 | 0.0 | 27 | 0 | 0.0 | 27 |
| Detached stems | Detached Calluna (no.) | 0.1 | 0.6 | 27 | 1.1 | 2.7 | 27 |
| | Detached vegetation (no.) | 0.3 | 0.9 | 27 | 0.3 | 0.8 | 27 |

4. Habitat condition assessment results 2014

4.1 Dry heath

Targets assessed at habitat level in 2 x 2 m quadrat:

| Dry heath (<i>n</i> =27 heather heath + 6 western heath + 26 fragmented heath) | | |
|--|---------------------------|-----------------------------|
| Target | % of points passed | Habitat pass or fail |
| Presence of moss, liverworts and non-crustose lichens ¹ | 92 | Pass |
| At least 50% of vegetation cover made up of Table 1 indicator species ² | 14 | Fail |
| At least 25% of dwarf shrub cover made up of Group (i) indicator species | 93 | Pass |
| Less than 50% of dwarf shrub cover made up of Group (ii) indicator species | 91 | Pass |
| At least two indicator species from Group (i) | 88 | Fail |
| Cover of weeds < 1% | 100 | Pass |
| Cover of soft rush < 10% | 95 | Pass |
| Dwarf shrub browsing < 33% ³ | 81 | Fail |
| Disturbed bare ground < 10% | 100 ⁴ | Pass |

¹ assessed in 1 x 1 m quadrat

² assessed as total dwarf shrub cover excluding dead and pioneer heather and recent burns

³ based on field assessment rather than the GI results

⁴ *n*=58 (1 point with no information)

Targets assessed at feature extent:

| Target | Pass or fail |
|---|---------------------|
| Cover of non-native species < 1% | Pass |
| Cover of bracken < 10% | Pass |
| Cover of native trees/ shrubs < 20% | Pass |
| Cover of weeds < 1% | Pass |
| Cover of soft rush < 10% | Pass |
| Burning of sensitive areas absent | Pass |
| Disturbed bare ground < 10% | Pass |
| Mature heather ≥10% & all growth phases present | Pass |

Indicator species frequencies (*n* = 59):

| Species | Frequency (%) | SD |
|--------------------------------|----------------------|-----------|
| <i>Calluna vulgaris</i> | 93 | 3.3 |
| <i>Erica tetralix</i> | 10 | 3.9 |
| <i>Erica cinerea</i> | 14 | 4.5 |
| <i>Vaccinium myrtillus</i> | 90 | 3.9 |
| <i>Vaccinium oxycoccus</i> | 0 | 0.0 |
| <i>Vaccinium vitis-idaea</i> | 0 | 0.0 |
| <i>Empetrum nigrum</i> | 0 | 0.0 |
| <i>Racomitrium lanuginosum</i> | 0 | 0.0 |
| <i>Ulex gallii</i> | 12 | 4.2 |
| <i>Myrica gale</i> | 2 | 1.7 |

4.2 Wet heath

This habitat type was recorded in less than 10 sample points so condition cannot be accurately assessed at 2 x 2m quadrat level.

Targets assessed at feature extent:

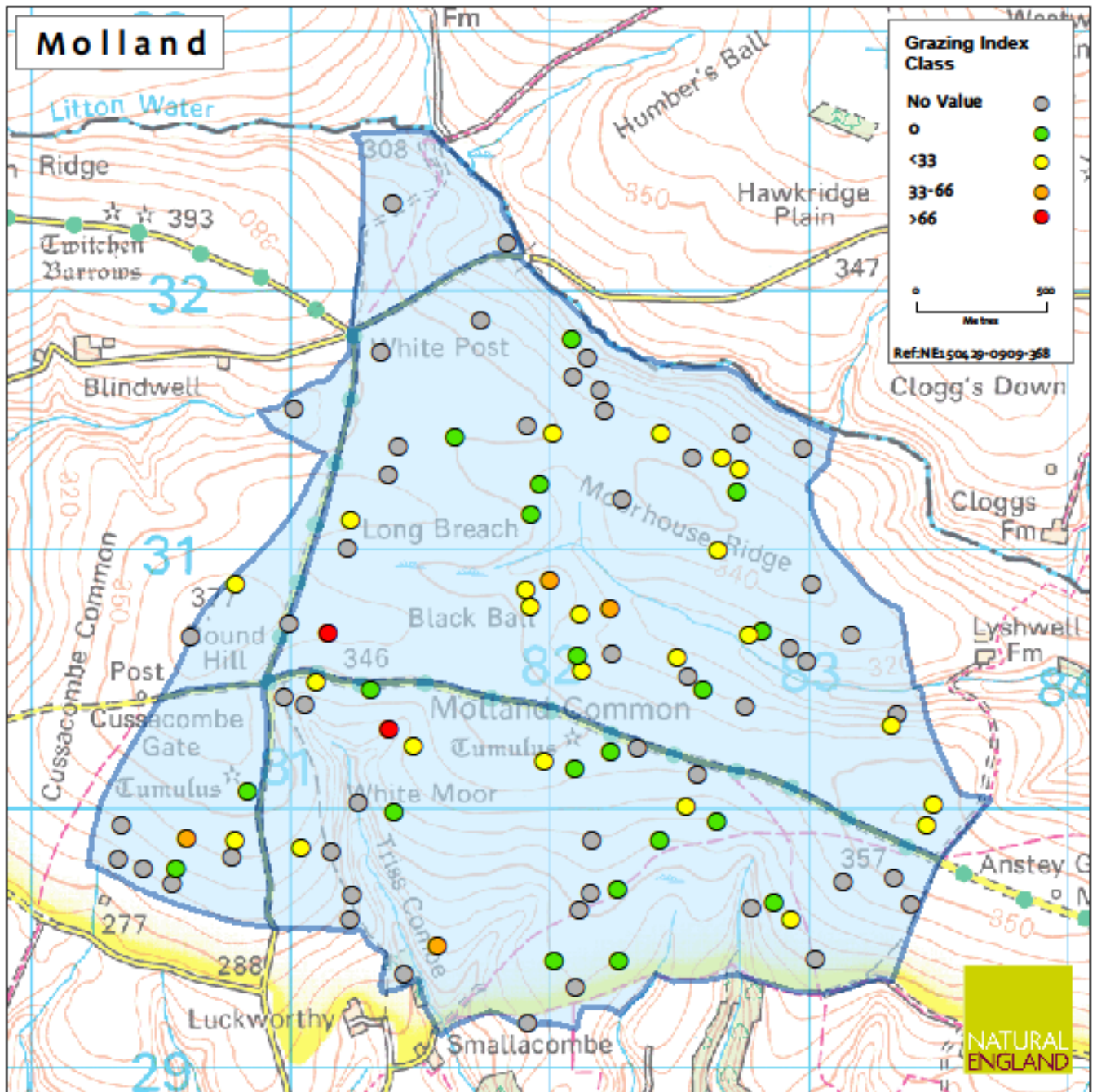
| Target | Pass or fail |
|-------------------------------------|--------------|
| Cover of native trees/ shrubs < 20% | Pass |
| Cover of bracken < 10% | Pass |
| Cover of non-native species < 1% | Pass |
| Cover of negative indicators < 1% | Pass |
| Cover of soft rush < 10% | Pass |
| Burning of bryophyte layer absent | Pass |
| Burning of sensitive areas absent | Pass |
| Active drainage < 10% | Pass |
| Disturbed bare ground < 10% | Pass |

4.3 Mires

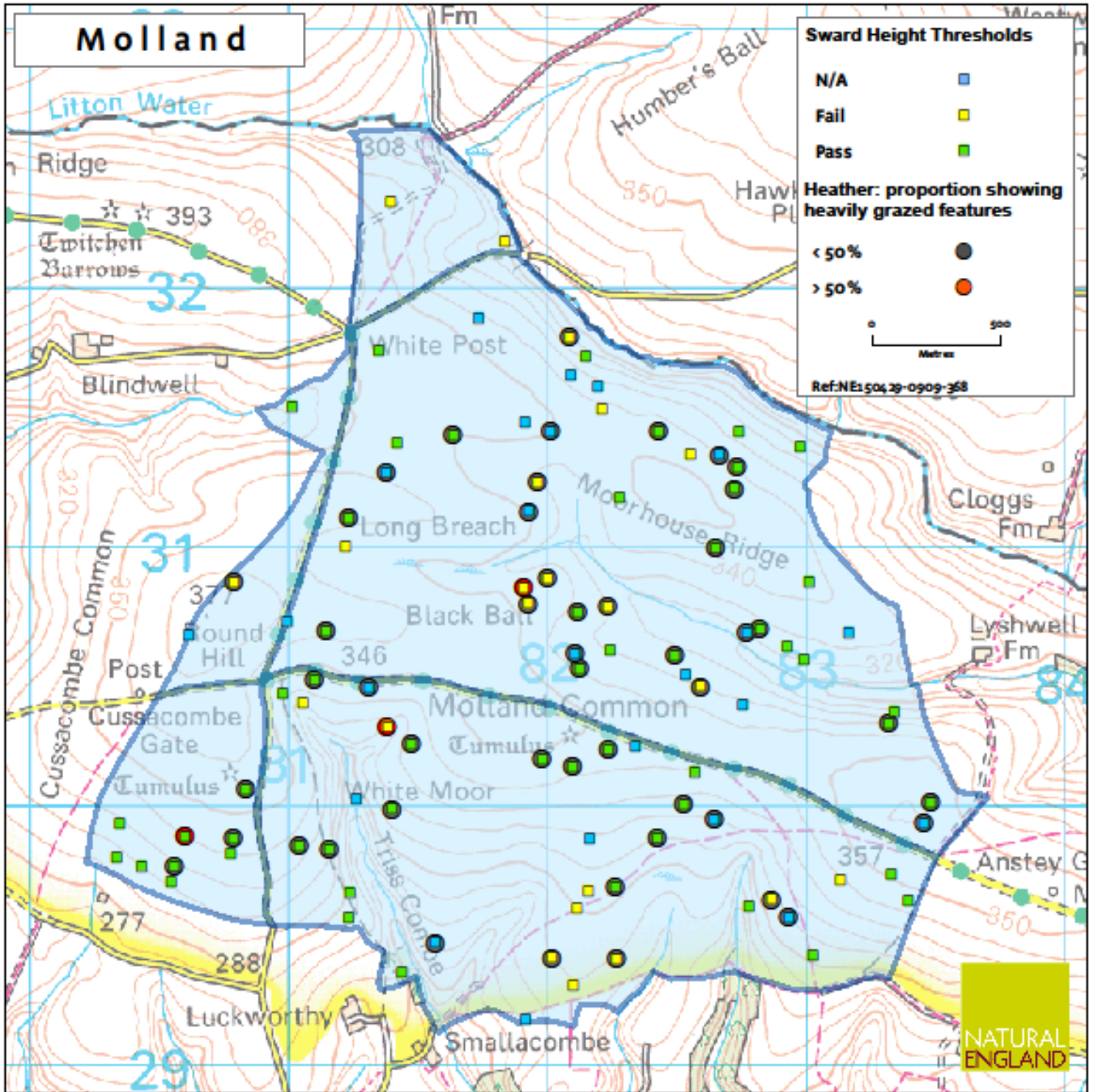
This habitat type was recorded in less than 10 sample points so condition cannot be accurately assessed at 2 x 2m quadrat level.

Targets assessed at feature extent:

| Target | Pass or fail |
|-------------------------------------|--------------|
| Cover of non-native species < 1% | Pass |
| Cover of native trees/ shrubs < 10% | Pass |
| Cover of negative indicators < 1% | Pass |
| Burning of bryophyte layer absent | Pass |
| Burning of sensitive areas absent | Pass |
| Extent of eroding peat | Pass |
| Disturbed bare ground < 10% | Pass |



Map 1: Distribution of random sampling points on Molland Moor in 2014, showing those where heather was present, along with heather grazing index (GI) class, derived from collected heather shoots.



Map 2: Distribution of sample points on Molland Moor in 2014 showing those which fall above (pass) or below (fail) habitat-related height thresholds indicative of heavy grazing, and with more or less than 50% of heather cover showing suppressed growth features.

Further information

Natural England evidence can be downloaded from our [Access to Evidence Catalogue](#). For more information about Natural England and our work see [Gov.UK](#). For any queries contact the Natural England Enquiry Service on 0300 060 3900 or e-mail enquiries@naturalengland.org.uk .

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Report number RP01639 Number 13
ISBN 978-1-78354-397-7