Dozmary Downs

1. Introduction

Natural England (NE) and its predecessors has 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 Dozmary Downs site was surveyed during 25 – 26 March 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

Dozmary Downs is located on Bodmin Moor and is 34.5 ha in area. A substantial proportion of the vegetation at this site comprises fragmented dry heath (42% of 2014 sample points; Figure 1) or heather heath (13%) with bent-fescue grassland (14%) and rough acid grassland (15%) accounting for much of the remainder (Figure 1). Towards the north of the site there are areas of frequent low *Ulex gallii* western heath, with *Ulex europaeus*, over 1 m tall, locally frequent across the site.

Heather is frequent throughout, occurring at 91% of sample points, although at relatively low levels of cover even in heathland vegetation types (6% mean cover in fragmented heath and 14% in heather heath). Heather was predominantly in the pioneer growth stage (88% of sample points where it is present), with a small amount of building phase (11%) also present (Figure 2). In the absence of burning, this suggests that there has been a relatively recent and significant recovery of heather from past heavy grazing. *Molinia caerulea* is the dominant grass species throughout much of the site (over 70% of sample points).

2.2 Site management

Environmental Cross Compliance (ECC) overgrazing controls were imposed on the site following a survey in 2003, which concluded that Dozmary Downs was significantly overgrazed. From December 2003 overgrazing restrictions limited grazing on the site to 10 livestock units (LUs) from December to April 15th (0.3 LU ha^{-1}), and 25 LUs (0.7 LU ha^{-1}) from April 16th to July. Following repeat surveys in 2004 and 2005 the stocking rate was reduced slightly to 10 LU between 1st November and 15th April, 25 LU between 16th April and 31st August and 18 LU (0.5 LU ha^{-1}) in September and October. In 2011, the site entered a Higher Level Stewardship (HLS) agreement. The average stocking rate from February to September was set at 0.32 LU ha^{-1}, with a stocking calendar setting maximum and minimum numbers of cattle during that period[1]. Winter grazing was not permitted unless NE judged there was sufficient vegetation.

A number of surveys have taken place on Dozmary Downs since an overgrazing problem was first confirmed in a 2001 Appraisal survey. The subsequent Evaluation survey in 2002 collected similar data to more recent Surveillance surveys but reported mainly on heather grazing index (GI) and other dwarf shrub variables. Since 2004 sward height data has also been included in reports and a random sampling strategy followed as in 2014. The various types of grazing assessment survey undertaken on Dozmary Downs, with variables recorded but not necessarily included in reports, are set out in Table 1.

Table 1: Past surveys of grazing pressure and impacts on Dozmary Downs, with the type of survey and sampling strategy followed.

Years	Survey type	Main variables	Sampling Strategy	Sample numbers
2002, 2003	Surveillance	GI, dwarf shrub variables, sward heights	grid	32
2004	Surveillance	GI, dwarf shrub variables, sward heights	random	50
2005, 2006	Surveillance	GI, dwarf shrub variables, sward heights	random	60

2.3 Condition and grazing pressure in 2014

Current levels of heather grazing are relatively low with the mean GI in 2014 being around 10% in both heather heath and fragmented heath. Overall only 12% of samples with heather present failed to meet the CSM GI target of less than 33%, above which level grazing is likely to be damaging (Figure 2, Table 2, Map 1). However, droppings of cattle / ponies were present at 15% of sample points in heather heath (4.5% overall; Figure 3f), so the GI (based on an assessment of grazing by sheep) in this vegetation type could be an underestimate. Sheep droppings were present at a small number of points in heather heath and fragmented heath, at 6.5% overall (Figure 3f). Heavily grazed features were present on around 10% of sample points in both vegetation types (Figure 3d, Map 2). The mean graminoid sward height at 24% of sample points indicated that heavy grazing was likely in these areas (Map 2). Together, over 25% of points have either a low sward height or a high proportion of heavily grazed features (HGF), at levels that would indicate that the site is overgrazed based on past ECC criteria.

Heather beetle damage was also noted at 10% of points across the site (Figure 3d). No evidence was noted of recent burning.

The dry heath habitat was below the condition assessment thresholds (targets to be passed at 90% of sample points) for the number of indicator species and on the range of heather growth phases

[1] Note that LU equivalents have varied among different schemes

with no mature heather recorded (Figure 2). If dwarf shrub cover is taken as indicator species cover, which for Dozmary Downs is a reasonable assumption as no *Racomitrium lanuginosum* was recorded, only one point meets the target, failing to achieve the threshold for this attribute by a very large margin. The lack of indicators is probably a legacy of previous heavy grazing, as current levels of heather grazing are relatively low. The site was however only just below the condition threshold for contribution of group (ii) indicator species, in this case western gorse, to dwarf shrub cover.

2.4 Change since previous surveys

Previous surveys in 2004, 2005 and 2006 used a similar sampling method to that in 2014. The grazing index varied significantly between 2004, 2005 and 2014 ($F_{2,125} = 17.77$, $P < 0.001$; Table 2), and was significantly lower in 2014 (11.2%) than both 2004 (31.4%) and 2005 (38.2%) ($P < 0.01$, $P < 0.001$ respectively; unequal N HSD tests) (GI data for 2006 were not available). The grazing index was notably higher at the time of the overgrazing survey in 2003 (72.8%), although the sampling method was different. Taking covers, heights and detached stems collectively, there was a significant difference between the four surveys ($P < 0.001$; Table 2). Dwarf shrub cover, heather cover, heather height and graminoid height were all greatest in 2014, when there were also fewest detached heather stems. Frequencies of livestock droppings and heavily grazed features were also significantly lower in 2014. This evidence all points to significantly reduced levels of grazing in 2014 compared to previous years, and a corresponding positive response in the vegetation structure, as further suggested by the current high frequency of pioneer heather.

The reductions in stocking levels since 2003, and again more recently under the HLS agreement have been successful in reducing the grazing intensity on heather and other vegetation on the site. The increase in dwarf shrub cover and vegetation height reflects this change in management and indicates that beneficial changes are occurring. However, the dry heath is still predominantly fragmented, and much longer timescales will be needed to allow recovery of indicator species and heather heath vegetation type.

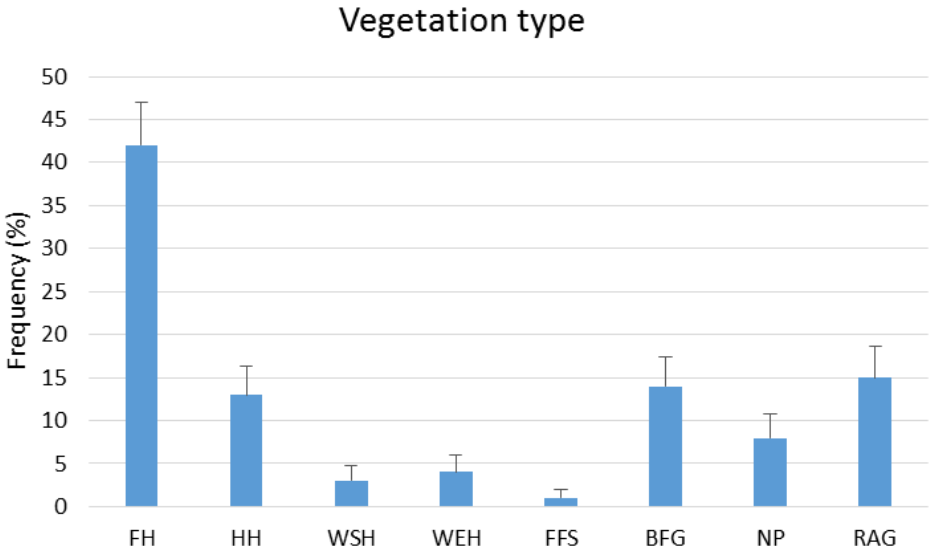

Figure 1. Frequency of vegetation types across the site in 2014. Bars are standard deviations. FH – fragmented heath; HH – heather heath; WSH – western heath; WEH – wet heath; FFS – flush, fen, & swamp; BFG – bent-fescue grassland; NP – non-productive; RAG – rough acid grassland.

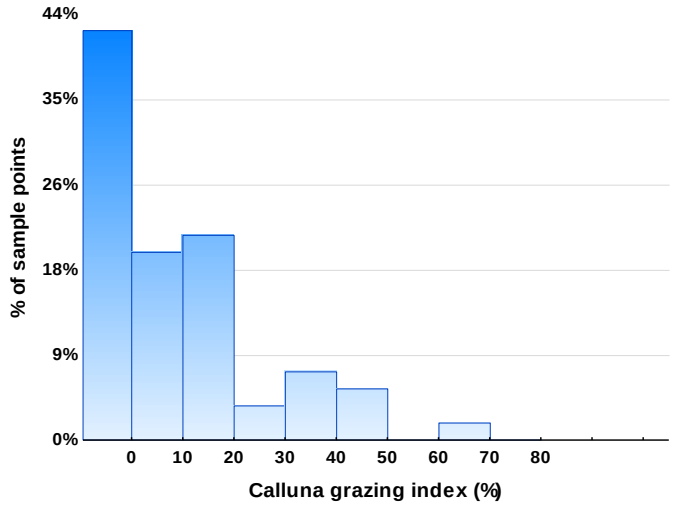

Figure 2. Frequency distribution of heather Grazing Index from sample points containing heather at whole site level in 2014.

Table 2. Heather Grazing Index in current (2014) and previous (2004-2005) surveys (mean ± standard deviation; *n* is number of sample points with heather stems).

	2004 Overall (*n* = 35)	2005 Overall (*n* = 36)	2014 Overall* (*n* = 57)	2014 Heather Heath (*n* = 12)	2014 Fragmented Heath (*n* = 35)
Grazing Index	31.4 ±32.58	38.2 ±24.44	11.2 ±14.62	9.5 ±10.91	11.1 ±14.61
Samples ≥ 33.3%	34.3%	55.6%	12.3%	8.3%	8.6%
Samples ≥ 66.6%	17.1%	8.3%	1.8%	0.0%	2.9%

* western heath *n*=3, wet heath *n*=3, non-target habitats *n*=4

Table 3. Cover, height and detached stems in current (2014) and previous (2004-2006) surveys (mean ± standard deviation; *n* is total number of sample points (covers, detached heather, detached vegetation), number of sample points containing heather or graminoids (heights)).

	2004			2005			2006			2014			$F_{3,161}$	*P*
	n	mean	st.dev.	*n*	mean	st.dev.	*n*	mean	st.dev.	*n*	mean	st.dev		
Dwarf shrub cover	50	2.7	±5.35	58	2.8	±5.00	56	2.4	±4.9	91	7.5	±11.16	12.0	<0.001
Bilberry cover	50	0.0	±0.00	58	0.0	±0.16	56	0.0	±0.07	91	0.0	±0.31	1.7	n.s.
Heather cover	50	2.3	±4.38	58	1.3	±2.14	56	2.1	±4.65	91	5.8	±8.81	12.3	<0.001
Bare ground	50	4.6	±14.00	58	0.6	±1.87	56	0.8	±2.83	91	0.6	±2.57	7.5	<0.001
Heather height	35	9.0	±16.90	36	8.0	±15.27	36	5.0	±2.95	58	10.3	±3.64	14.7	<0.001
Graminoid height	50	5.6	±2.20	58	5.3	±1.79	56	4.5	±1.81	91	6.8	±2.75	8.1	<0.001
Detached heather	50	0.8	±2.22	58	0.8	±1.36	56	0.7	±1.57	91	0.1	±0.27	7.5	<0.001
Detached vegetation	50	0.0	±0.00	58	0.0	±0.00	56	0.0	±0.00	91	0.0	±0.21	1.2	n.s.
													$F_{24,447}$	*P*
											Overall		6.5	<0.001

Table 4. Livestock droppings, burning and heavily grazed features in current (2014) and previous (2004-2006) surveys (presence, standard deviation and chi-square results; *n* is total number of sample points (droppings), number of sample points containing heather (heavily grazed features, burning)).

	2004			2005			2006			2014		*Chi-square*	*P*
	n	presence	st.dev.	*n*	presence	st.dev.	*n*	presence	st.dev.	*n*	presence	st.dev		
Livestock droppings	50	13	3.10	60	13	3.19	56	21	3.62	92	4	1.96	26.3	<0.001
Heavily grazed features	35	31	1.88	36	34	1.37	36	33	1.66	58	6	2.32	106.8	<0.001
Burning	35	0	0.00	36	0	0.00	36	0	0.00	58	0	0.00	Insufficient data	

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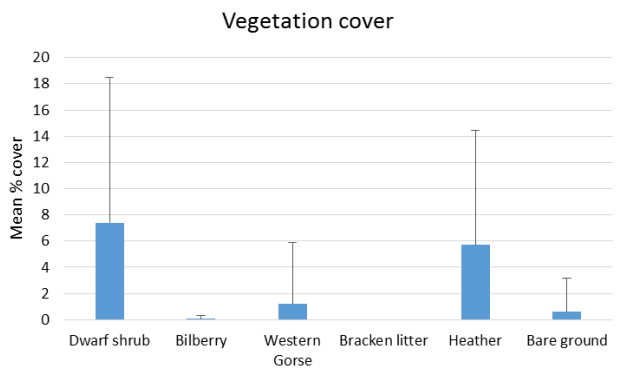

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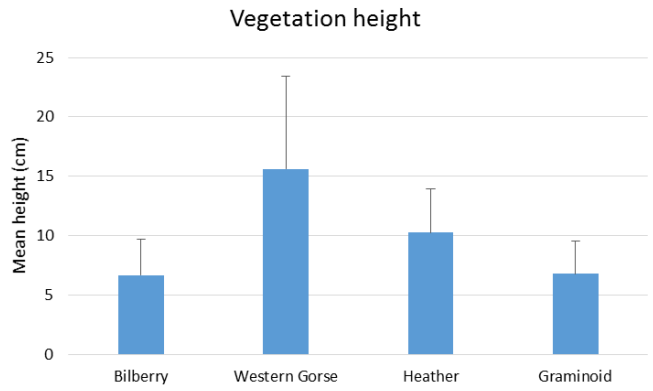

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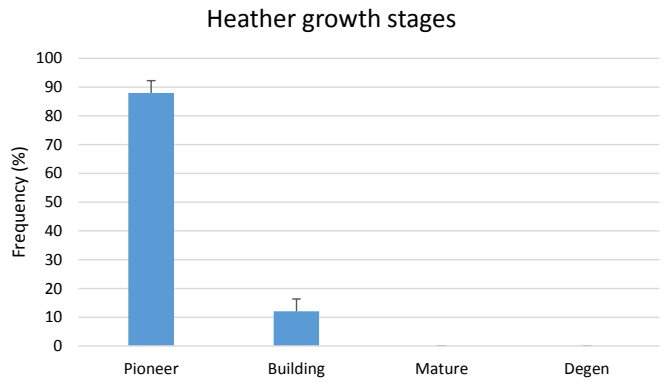

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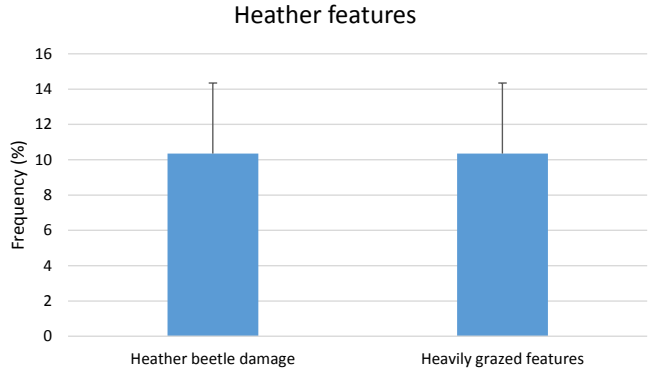

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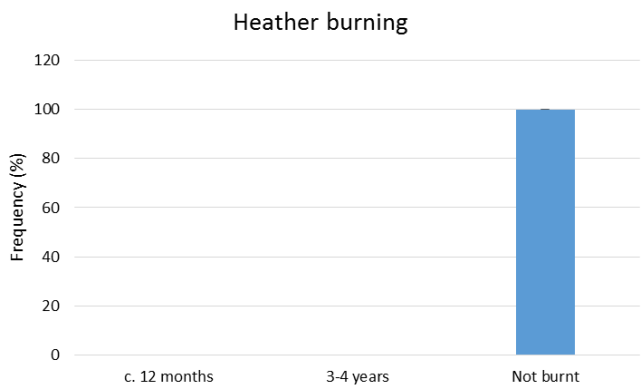

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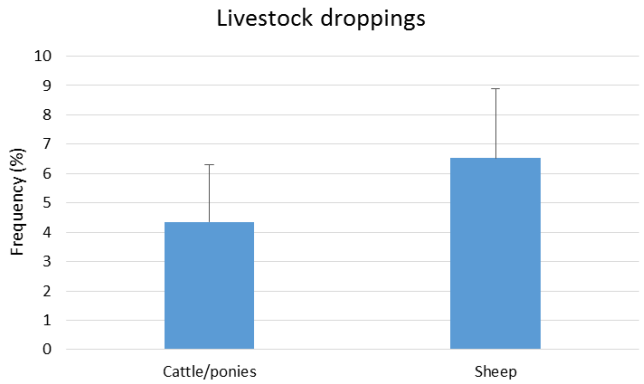

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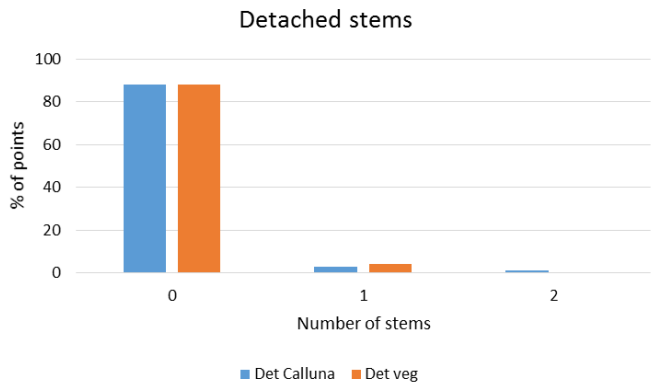

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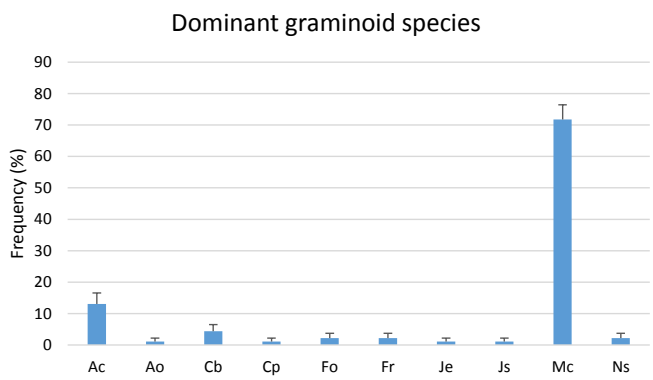


Figure 3. Surveillance variables at whole site level in 2014 (bars are standard deviations).

3. Overgrazing surveillance variables 2014

		Fragmented Heath (*n* = 42)			Heather Heath (*n* = 13)		
Category	**Variable**	**Mean**	**SD**	***n***	**Mean**	**SD**	***n***
Peat	Peat depth (cm)	11	4.5	42	11	5.8	13
Vegetation cover	Dwarf shrub cover (%)	7	9.5	42	17	14.8	13
	Bilberry cover (%)	0	0.0	42	0	0.0	13
	Western Gorse cover (%)	0	1.5	42	2	5.5	13
	Bracken litter cover (%)	0	0.0	42	0	0.0	13
	Calluna cover (%)	6	9.4	42	14	9.9	13
	Bare ground (%)	1	3.1	42	0	0.0	13
Vegetation height	Bilberry height (cm)	0	0	0	0	0	0
	Western Gorse height (cm)	11	2.7	5	11	1.4	2
	Calluna height (cm)	10	3.9	35	9	2.6	12
	Graminoid height (cm)	6	2.9	41	7	1.5	13
Heather growth stages	Pioneer (% of points)	91	4.7	35	92	8.0	12
	Building (% of points)	9	4.7	35	8	8.0	12
	Mature (% of points)	0	0.0	35	0	0.0	12
	Degenerate (% of points)	0	0.0	35	0	0.0	12
Heather features	Heather beetle damage (% of points)	6	3.9	35	8	8.0	12
	Heavily grazed features (% of points)	11	5.4	35	8	8.0	12
Heather burning	Burnt (*c.* 12 months) (% of points)	0	0.0	35	0	0.0	12
	Burnt (3-4 years) (% of points)	0	0.0	35	0	0.0	12
Droppings	Cattle / ponies (% of points)	5	3.3	42	15	10.0	13
	Sheep (% of points)	5	3.3	42	0	0.0	13
Detached stems	Detached Calluna (no.)	0.1	0.3	42	0	0.0	13
	Detached vegetation (no.)	0.0	0.2	42	0	0.0	13

4. Habitat condition assessment results 2014

4.1 Dry heath

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

Dry heath (*n*=13 heather heath + 3 western heath + 38 fragmented heath)		
Target	% of points passed	Habitat pass or fail
Presence of moss, liverworts and non-crustose lichens[1]	98	Pass
At least 50% of vegetation cover made up of Table 1 indicator species[2]	2	Fail
At least 25% of dwarf shrub cover should be made up of Group (i) indicator species	96	Pass
Less than 50% of dwarf shrub cover made up of Group (ii) indicator species	87	Fail
At least two indicator species from Group (i)	59	Fail
Cover of weeds < 1%	100	Pass
Cover of soft rush < 10%	98	Pass
Dwarf shrub browsing < 33%	98	Pass
Disturbed bare ground < 10%	100	Pass

[1] assessed in 1 x 1 m quadrat

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

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	Fail

Indicator species frequencies (*n* = 54):

Species	**Frequency (%)**	**SD**
Calluna vulgaris	100	0.0
Erica tetralix	48	6.8
Erica cinerea	0	0.0
Vaccinium myrtillus	15	4.8
Vaccinium oxycoccus	0	0.0
Vaccinium vitis-idaea	0	0.0
Empetrum nigrum	0	0.0
Racomitrium lanuginosum	15	4.8
Ulex gallii	26	6.0
Myrica gale	0	0.0

4.2 Wet heath

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

Targets assessed at feature extent:

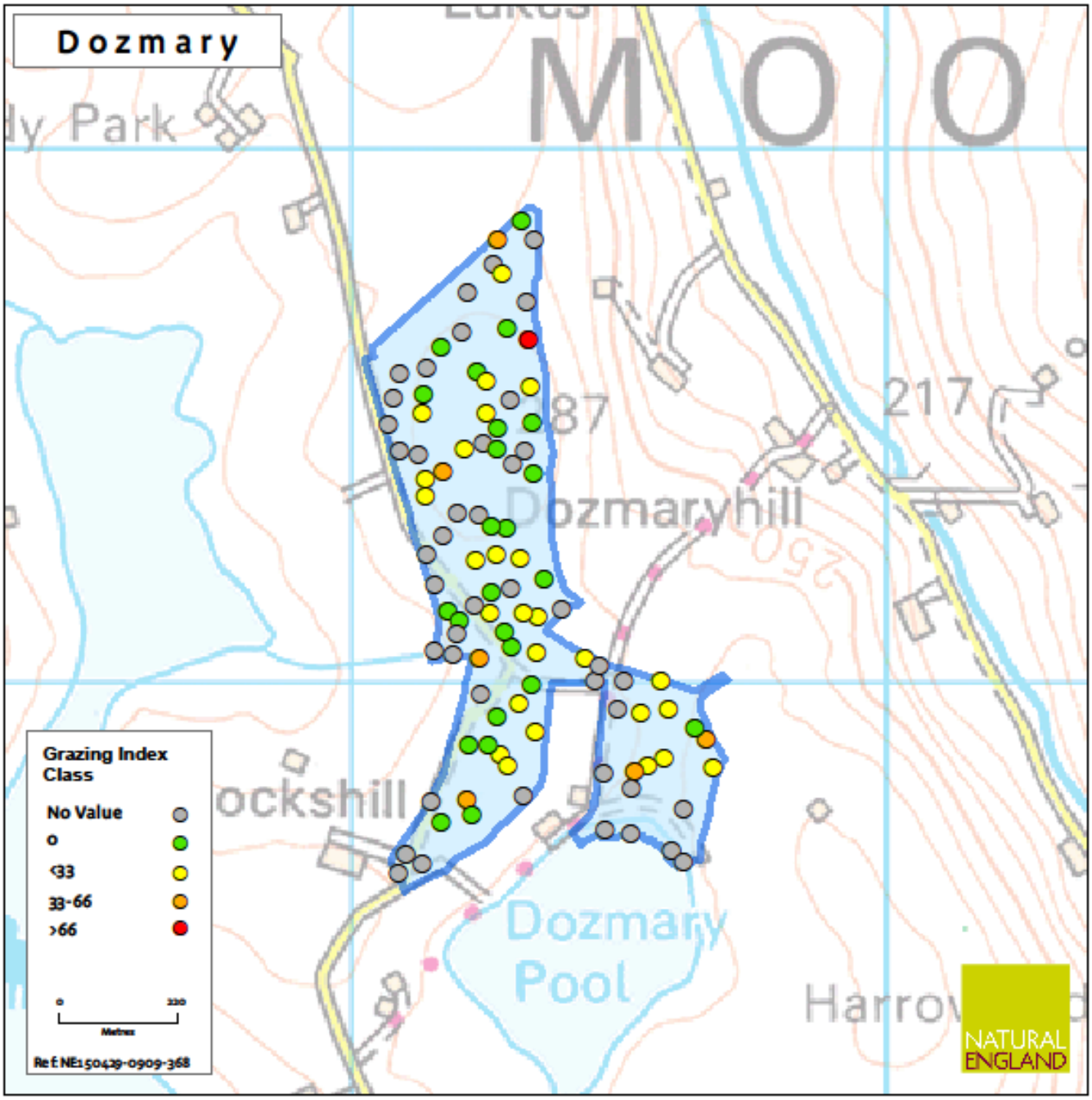
Target	**Pass or fail**
Cover of native trees/ shrubs < 20%	Pass
Cover of bracken < 10%	Pass
Cover of non-native species < 1%	Pass
Cover of negative indicators < 1%	Pass
Cover of soft rush < 10%	Pass
Burning of bryophyte layer absent	Pass
Burning of sensitive areas absent	Pass
Active drainage < 10%	Pass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

4.3 Mires

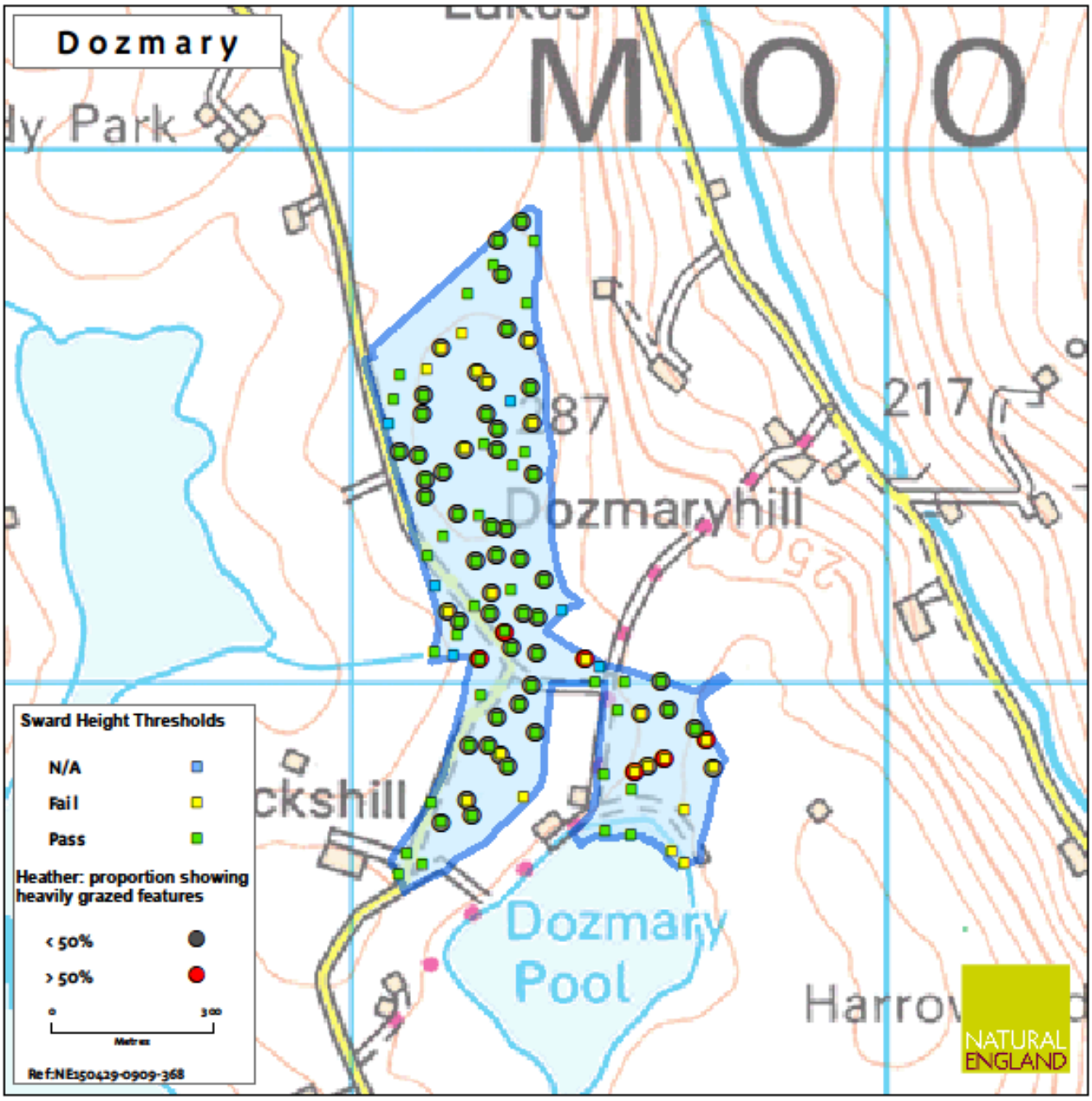
This habitat type was recorded at less than 10 sample points so condition cannot be accurately assessed at 2 x 2m quadrat level.

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 Dozmary Downs 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 Dozmary Downs 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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