Okehampton Common

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 Okehampton Common site was surveyed during 2 – 3 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

Okehampton Common is located on Dartmoor and covers 1300 ha within North Dartmoor SSSI and Dartmoor SAC. Although approximately one third of the site is dry heath habitat, the majority of this is fragmented heath (26% of sample points in 2014; Figure 1) with intact heather heath much scarcer (8% of sample points). Mire vegetation was recorded at 21% of sample points, although peat may underlie some of the other vegetation types, with much of the remaining vegetation on the site comprising bent-fescue grassland (19%) and rough acid grassland. Overall, although frequent, heather attained only relatively low levels of cover (3% in both fragmented heath and blanket bog; 6% in other target habitats), frequently exhibiting heavily grazed features. The majority was in the building growth phase (59% of sample points where present), with a significant amount of mature (31%) and some pioneer (9%) heather. On the north side of Yes Tor, it appeared to have been burnt in the recent past and had not recovered. There are occasional patches of western heath (3% of sample points) and *Vaccinium myrtillus* was present on some of the steeper slopes. *Molinia caerulea* was generally frequent to abundant in blanket bog, and was the most commonly dominant graminoid across the site. *Sphagnum* was only rare to locally frequent in the blanket bog. On higher

ground, *Racomitrium lanuginosum* was locally abundant. Flushes are frequent on hillsides, usually with abundant *Sphagnum*, *Eriophorum angustifolium* and *Carex* spp.

2.2 Site management

Following concerns about overgrazing and an initial English Nature Grazing Index (ENGI) survey in 1998, an agreement was reached with graziers in 1999 to restrict stocking levels. In 2002, the site was entered into a Tier 1E agreement with Winter Cattle Removal Supplement in the Dartmoor Environmentally Sensitive Area (ESA). This was followed by a Sheep Wildlife Enhancement Scheme (SWES) agreement in 2004, which reduced stocking levels further. The site entered a Higher Level Stewardship (HLS) agreement in 2012. Requirements under HLS are maxima of 0.08 LU ha^{-1} in summer for both cattle and sheep, 0.07 LU ha^{-1} for cattle in autumn and none in winter, and 0.05 LU ha^{-1} for sheep in autumn and winter. This gives a maximum average of 0.16 LU ha^{-1} in summer and 0.07 LU ha^{-1} in winter, and an overall average of 0.11 LU ha^{-1}. Stocking rates prior to HLS[1] are reproduced in Table 1.

Table 1. Stocking rates prior to HLS agreement in 2012.

Period	Average Annual Stocking Rate (LU h^{-1})	Maximum Monthly Stocking Rate (LU h^{-1})	Average Summer Stocking Rate (LU h^{-1})	Average Winter Stocking Rate (LU h^{-1})
Before 2000	0.91	1.15 (September)	0.96	0.90
2000 – 2002 (ECC restrictions)	0.33	0.37 (April 16 – October 30)	0.37	0.28
After 2002 (ESA Agreement)	0.17	0.28 (April 16 – October 30)	0.22	0.11
After 2004 (SWES Agreement)	0.13	0.22 (Jun-July)	0.19	0.08

A number of surveys have taken place over the last 15 or so years, and are summarised in Table 2. The 1999 survey which confirmed an overgrazing problem and follow-up in 2000 focussed on grazing pressure on dwarf shrub, deriving a heather grazing index (GI) from shoots collected in the field. The development of the Surveillance Survey following the Moorland Appraisal Pilot Project (MAPP) in 2002 saw a more holistic approach to the assessment of grazing pressure and added the measurement of sward heights, which could be compared to threshold heights for broad habitats, below which a sample area is deemed to be heavily grazed. Some sward height data had been collected in previous surveys, but not used in reporting. Other surveillance variables, some of which had also been collected in older surveys, include dwarf shrub heights, the presence of suppressed heather growth features, bare ground and livestock droppings. Surveillance surveys were often carried out on land where overgrazing measures had been implemented, but has subsequently entered an agri-environment agreement. The various types of grazing assessment survey undertaken on Okehampton Common are set out in Table 2.

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

Table 2: Past surveys of grazing pressure and impacts on Okehampton Common, with the type of survey and sampling strategy followed.

Years	Survey type	Main variables	Sampling Strategy	Sample numbers
1998	Overgrazing, ENGI	ENGI, dwarf shrub variables	Index units, structured walk	29 index units, each with 25 stops
1999, 2000	Overgrazing	GI, dwarf shrub variables	grid	147
2002	Surveillance	GI, dwarf shrub variables, sward heights	grid	147
2004, 2006, 2008	Surveillance	GI, dwarf shrub variables, sward heights	random	145

2.3 Condition and grazing pressure in 2014

There was considerable evidence of high levels of grazing on the site. The mean GI was high (63%; Table 3) and 72% of samples did not meet the CSM GI target of less than 33%, indicating grazing that is likely to be damaging (Figure 2, Table 3, Map 1), with 62.5% at or above a level of 66%. Heavily grazed features were very frequent across all target vegetation types (79% in fragmented heath, 67% in blanket bog and 100% in other types; 84% overall, Figure 3d, Map 2). The mean sward height at 47% of sample points where graminoids could be measured, or 46% overall, further indicated that heavy grazing was likely in these areas (Map 2). Detached vegetation and heather stems were also recorded fairly frequently, especially in fragmented heath (Figure 3g). There was little evidence of clear pattern in the distribution of grazing impacts across the Common other than perhaps a tendency for the graminoid height threshold to be failed more in the central section (Map 2).

A small amount of burning during the previous 3-4 years was evident, mainly in fragmented heath, but none in the last 12 months (Figure 3e).

Browsing on dwarf shrubs was also a major factor affecting habitat condition, with dry heath falling well below this attribute condition threshold (targets to be passed at 90% of sample points). Blanket bog also failed to meet the threshold for dwarf shrub browsing levels, but lack of indicator species was the major failing in this habitat. The dry heath habitat also failed to reach the thresholds for cover of indicator species, where the measure of dwarf shrub cover is taken as indicator species cover - a reasonable assumption for Okehampton Common as no *Racomitrium lanuginosum* was recorded. The thresholds for composition of dwarf shrub indicator species were just met. Recent burning was not an issue in the condition assessment of either habitat.

2.4 Change since previous surveys

Previous surveys in 2004, 2006 and 2008 used a similar sampling method to that in 2014. There was a significant difference in the GI index between these surveys ($F_{3,204}$ = 4.85, P < 0.01), the greatest change being the increase from 43.3% in 2004 to 63.2% in 2014 (P = 0.06, unequal N HSD test; Table 3). Taking covers, heights and detached stems collectively, there was also a significant difference between the four surveys (Table 4). Most of the change occurred between 2006 and 2008, with significant declines in dwarf shrub cover, heather cover and heather height, but also of detached heather stems. However, *Vaccinium* cover and height increased in 2014 but detached vegetation also increased. No changes were detected in other variables including livestock droppings, heavily grazed features and recent burning (Table 5).

The changes to stocking densities required under the agri-environment scheme agreements have not had the desired effect of reducing grazing intensity on heather, which has actually increased

over time. However, there has been some recent improvement in the condition of *Vaccinium*, which might be attributable to the more recent HLS agreement. The full effect of stock reductions is expected only to manifest after a longer period of time, although further reductions might be necessary. Livestock being moved off the Dartmoor military Training Area prior to firing and more generally straying between this and adjacent commons and the Forest of Dartmoor might also be an issue in relation to actual stocking rates and grazing pressure (D. Glaves, pers. comm.).

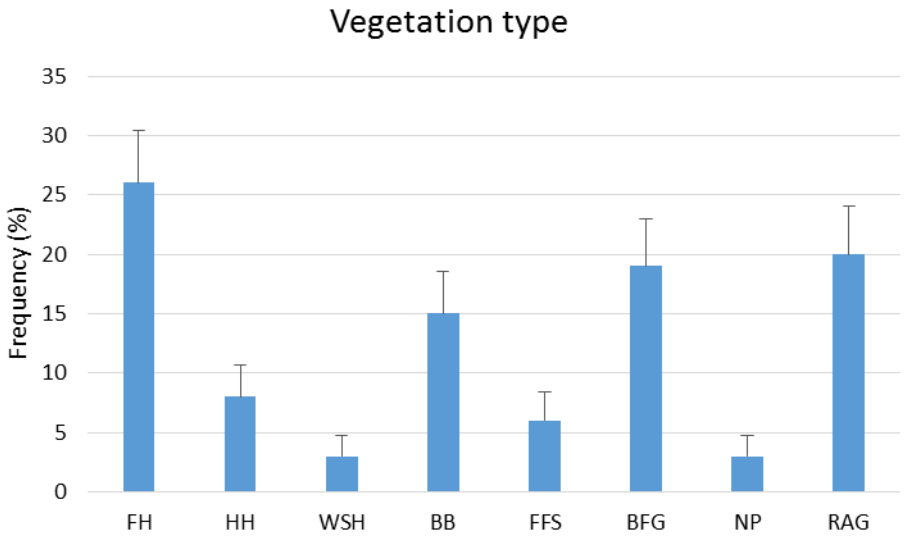


Figure 1. Frequency of vegetation types across the site in 2014. Bars are standard deviations. FH – fragmented heath; HH – heather heath; WSH – western heath; BB – blanket bog; FFS – flush, fen, & swamp; BFG – bent-fescue grassland; NP – non-productive; RAG – rough acid grassland.

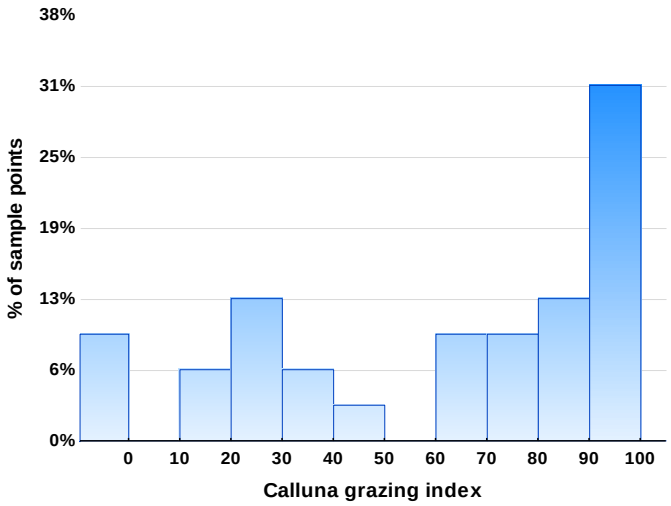


Figure 2. Frequency distribution of heather Grazing Index from sample points containing heather at whole site level in 2014.

Table 3. Heather Grazing Index in current (2014) and previous (2004-2008) surveys (mean ± standard deviation; *n* is number of sample points with heather stems).

	2004	2006	2008	2014			
	Overall (*n* = 87)	Overall (*n* = 64)	Overall (*n* = 25)	Overall* (*n* = 32)	Fragmented Heath (*n* = 14)	Blanket Bog (*n* = 6)	Heather Heath (*n* = 7)
Grazing Index	43.3 ±28.98	47.3 ±29.32	64.0 ±31.51	63.2 ±36.17	72.7 ±36.71	29.7 ±19.05	65.2 ±29.12
Samples ≥ 33.3%	66.7%	59.4%	88.0%	71.9%	78.6%	33.3%	85.7%
Samples ≥ 66.6%	23.0%	29.7%	52.0%	62.5%	78.6%	16.7%	57.1%

* non-target habitats *n* = 5

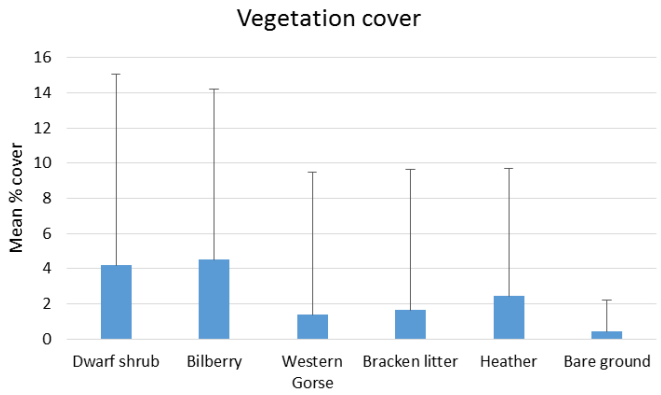
Table 4. Cover, height and detached stems in current (2014) and previous (2004-2008) surveys (mean ± standard deviation; *n* is total number of sample points (covers, detached heather, detached vegetation), number of sample points containing heather or graminoids (heights)).

	2004			2006			2008			2014			$F_{3,225}$	*P*
	n	mean	st.dev.	*n*	mean	st.dev.	*n*	mean	st.dev.	*n*	mean	st.dev		
Dwarf shrub cover	144	9.8	±16.30	141	8.2	±16.06	120	3.8	±13.09	96	4.2	±10.92	10.5	<0.001
Bilberry cover	144	0.2	±0.46	141	0.2	±0.55	120	0.5	±1.15	96	4.5	±9.73	22.4	<0.001
Heather cover	144	8.5	±15.88	141	7.3	±14.99	120	1.6	±6.63	96	2.5	±7.26	9.8	<0.001
Bare ground	144	0.4	±1.52	141	0.3	±2.20	120	0.1	±0.67	96	0.4	±1.83	1.2	n.s.
Bilberry height	0			46	7.5	±4.98	0			43	8.8	±5.01	22.5	<0.001
Heather height	87	11.9	±9.06	64	11.1	±4.99	50	6.4	±6.54	32	8.2	±4.08	22.5	<0.001
Graminoid height	144	8.0	±4.00	138	7.7	±4.44	119	6.8	±3.71	94	6.0	±3.33	2.2	n.s.
Detached heather	144	3.0	±7.50	141	3.0	±5.98	120	0.4	±1.01	96	0.2	±0.57	12.7	<0.001
Detached vegetation	144	0.0	±0.00	141	0.0	±0.00	120	0.0	±0.00	96	1.0	±3.25	5.6	<0.001
													$F_{24,633}$	*P*
											Overall		8.2	<0.001

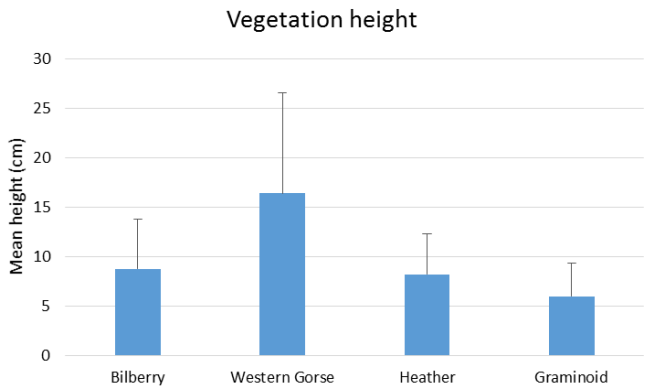
Table 5. Livestock droppings, burning and heavily grazed features in current (2014) and previous (2004-2008) surveys (presence, standard deviation and chi-square results; *n* is total number of sample points (droppings), number of sample points containing heather (heavily grazed features, burning)).

	2004			2006			2008			2014		*Chi-square*	*P*
	n	presence	st.dev.	*n*	presence	st.dev.	*n*	presence	st.dev.	*n*	presence	st.dev		
Livestock droppings	144	55	5.83	143	45	5.55	120	41	5.20	97	36	4.76	1.7	n.s.
Heavily grazed features	87	76	3.10	64	56	2.65	35	25	2.67	32	27	2.05	5.5	n.s.
Burning	87	1	0.99	64	0	0.00	35	0	0.00	32	2	1.37	7.0	n.s.

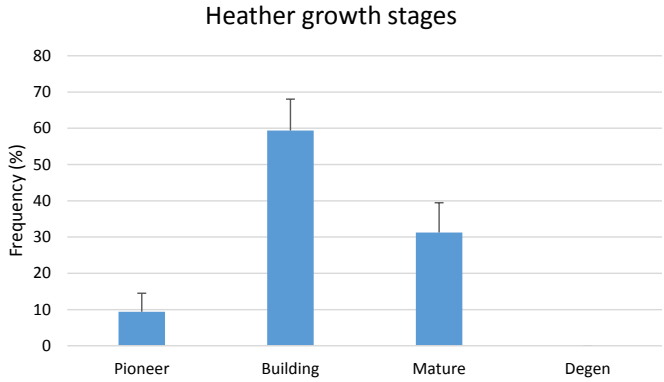
a)



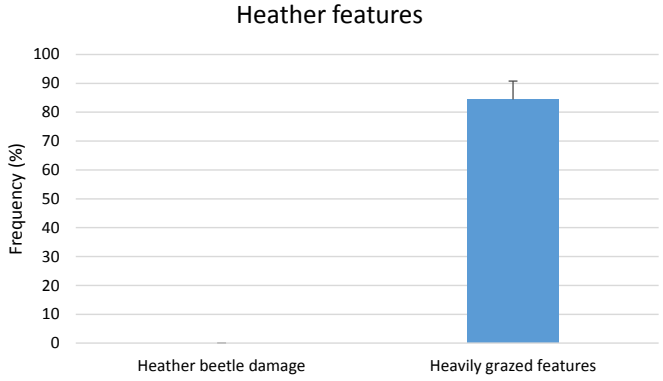
b)



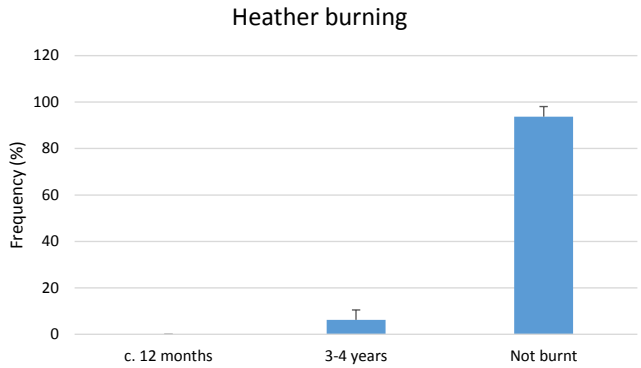
c)



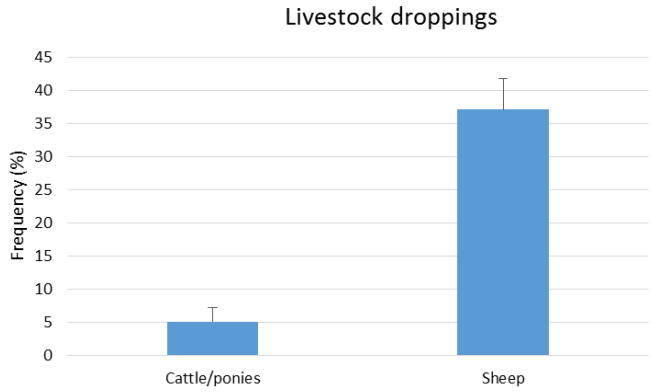
d)



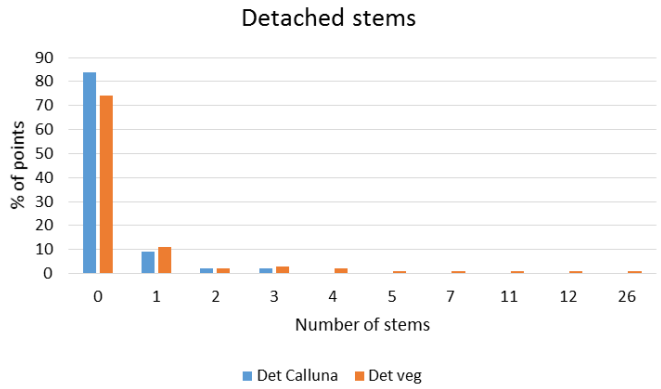
e)



f)



g)



h)

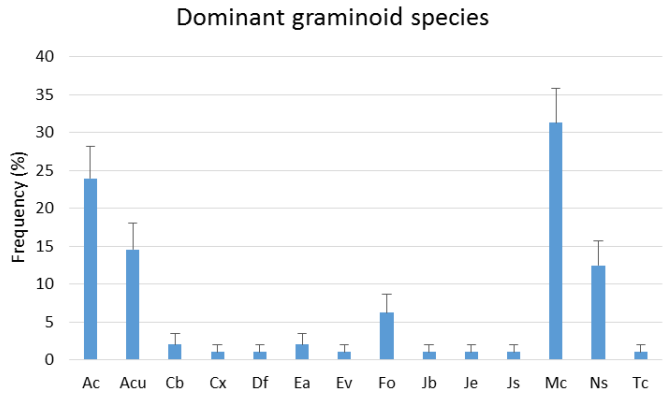


Figure 3. Surveillance variables at whole site level in 2014 (bars are standard deviations).

3. Overgrazing surveillance variables 2014

		Fragmented Heath (*n* = 26)			Blanket Bog (*n* = 15)			Other Target Types* (*n* = 17)		
Category	**Variable**	**Mean**	**SD**	***n***	**Mean**	**SD**	***n***	**Mean**	**SD**	***n***
Peat	Peat depth (cm)	17	9.8	26	73	21.7	15	22	18.5	17
Vegetation cover	Dwarf shrub cover (%)	4	5.9	26	4	4.2	15	14	22.3	17
	Bilberry cover (%)	8	9.5	26	2	6.5	15	9	16.7	17
	Western Gorse cover (%)	0	1.4	26	0	0.0	15	7	18.6	17
	Bracken litter cover (%)	0	0.8	26	0	0.0	15	0	0.0	17
	Calluna cover (%)	3	5.7	26	3	4.0	15	6	14.7	17
	Bare ground (%)	0	0.0	26	1	3.4	15	0	0.5	17
Vegetation height	Bilberry height (cm)	10	5.7	23	14	0.0	1	8	3.4	7
	Western Gorse height (cm)	7	2.8	2	0	0.0	0	23	7.4	3
	Calluna height (cm)	7	2.5	14	9	2.6	6	11	7.0	7
	Graminoid height (cm)	6	2.3	25	8	3.1	13	8	3.0	17
Heather growth stages	Pioneer (% of points)	14	9.4	14	0	0.0	6	0	0.0	7
	Building (% of points)	50	13.4	14	100	0.0	6	57	18.7	7
	Mature (% of points)	36	12.8	14	0	0.0	6	43	18.7	7
	Degenerate (% of points)	0	0.0	14	0	0.0	6	0	0.0	7
Heather features	Heather beetle damage (% of points)	0	0.0	14	0	0.0	6	0	0.0	7
	Heavily grazed features (% of points)	79	11.0	14	67	19.2	6	100	0.0	7
Heather burning	Burnt (*c.* 12 months) (% of points)	0	0.0	14	0	0.0	6	0	0.0	7
	Burnt (3-4 years) (% of points)	7	6.9	14	0	0.0	6	14	13.2	7
Droppings	Cattle / ponies (% of points)	0	0.0	26	20	10.3	15	0	0.0	17
	Sheep (% of points)	50	9.8	26	7	6.4	15	24	10.3	17
Detached stems	Detached Calluna (no.)	0.5	0.8	26	0.3	0.8	15	0.1	0.3	17
	Detached vegetation (no.)	0.8	2.2	26	0.0	0.0	15	0.1	0.2	17

* Other target types = Heather heath (n=8); Western heath (n=3); and Flushes, fens & swamps (n=6).

4. Habitat condition assessment results 2014

4.1 Dry heath

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

Dry heath (*n*= 8 heather heath + 3 western heath + 20 fragmented heath)		
Target	% of points passed	Habitat pass or fail
Presence of moss, liverworts and non-crustose lichens[1]	100[2]	Pass
At least 50% of vegetation cover made up of Table 1 indicator species[3]	6	Fail
At least 25% of dwarf shrub cover should be made up of Group (i) indicator species	87	Pass
Less than 50% of dwarf shrub cover made up of Group (ii) indicator species	87	Pass
At least two indicator species from Group (i)	87	Fail
Cover of weeds < 1%	100	Pass
Cover of soft rush < 10%	100	Pass
Dwarf shrub browsing < 33%	16	Fail
Disturbed bare ground < 10%	100	Pass

[1] assessed in 1 x 1 quadrat
[2] n=29 (2 points with no information)
[3]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* = 31):

Species	**Frequency (%)**	**SD**
Calluna vulgaris	84	6.6
Erica tetralix	13	6.0
Erica cinerea	3	3.2
Vaccinium myrtillus	84	6.6
Vaccinium oxycoccus	0	0.0
Vaccinium vitis-idaea	0	0.0
Empetrum nigrum	0	0.0
Racomitrium lanuginosum	45	8.9
Ulex gallii	23	7.5
Myrica gale	0	0.0

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

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

Mires (*n*=15 blanket bog + 6 flushes, fens & swamps)		
Target	% of points passed	Habitat pass or fail
At least 6 indicator species present	48	Fail
At least 50% of vegetation cover made up of at least 3 indicator species	43	Fail
Sphagnum cover should not consist of only *Sphagnum fallax*	82 [1]	Fail
Any one of *Eriophorum vaginatum*, Ericaceous spp. collectively or *Trichophorum* should not individually exceed 75% of veg cover	100	Pass
Less than 1% of vegetation cover to comprise of negative indicators	95	Pass
Dwarf shrub browsing < 33%	81	Fail
Disturbed bare ground/ drainage < 10%	90	Pass
Broken/ crushed *Sphagnum* < 10%	95	Pass

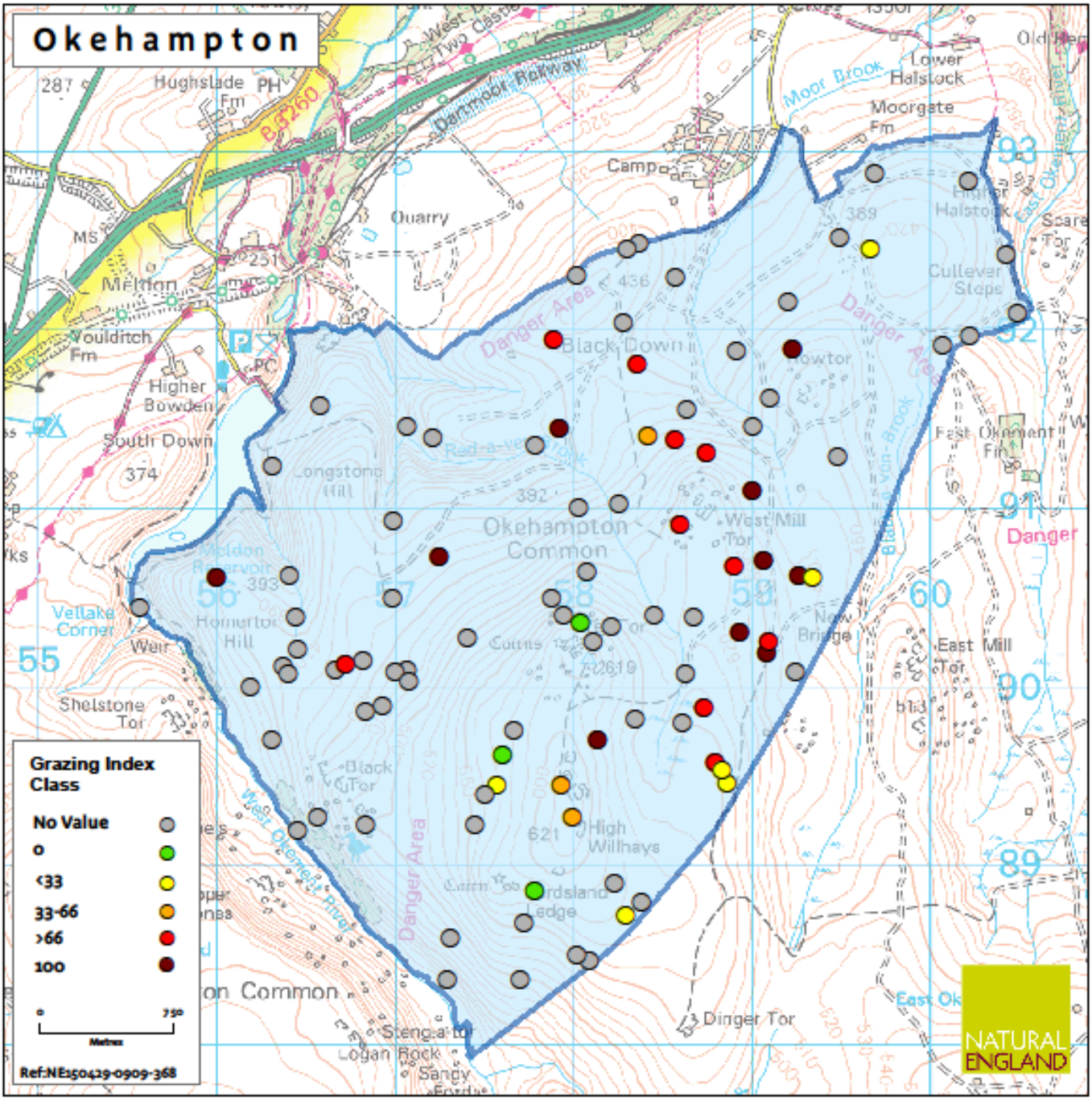
[1] n= 17 (17 points with *Sphagnum* present)

Targets assessed at feature extent:

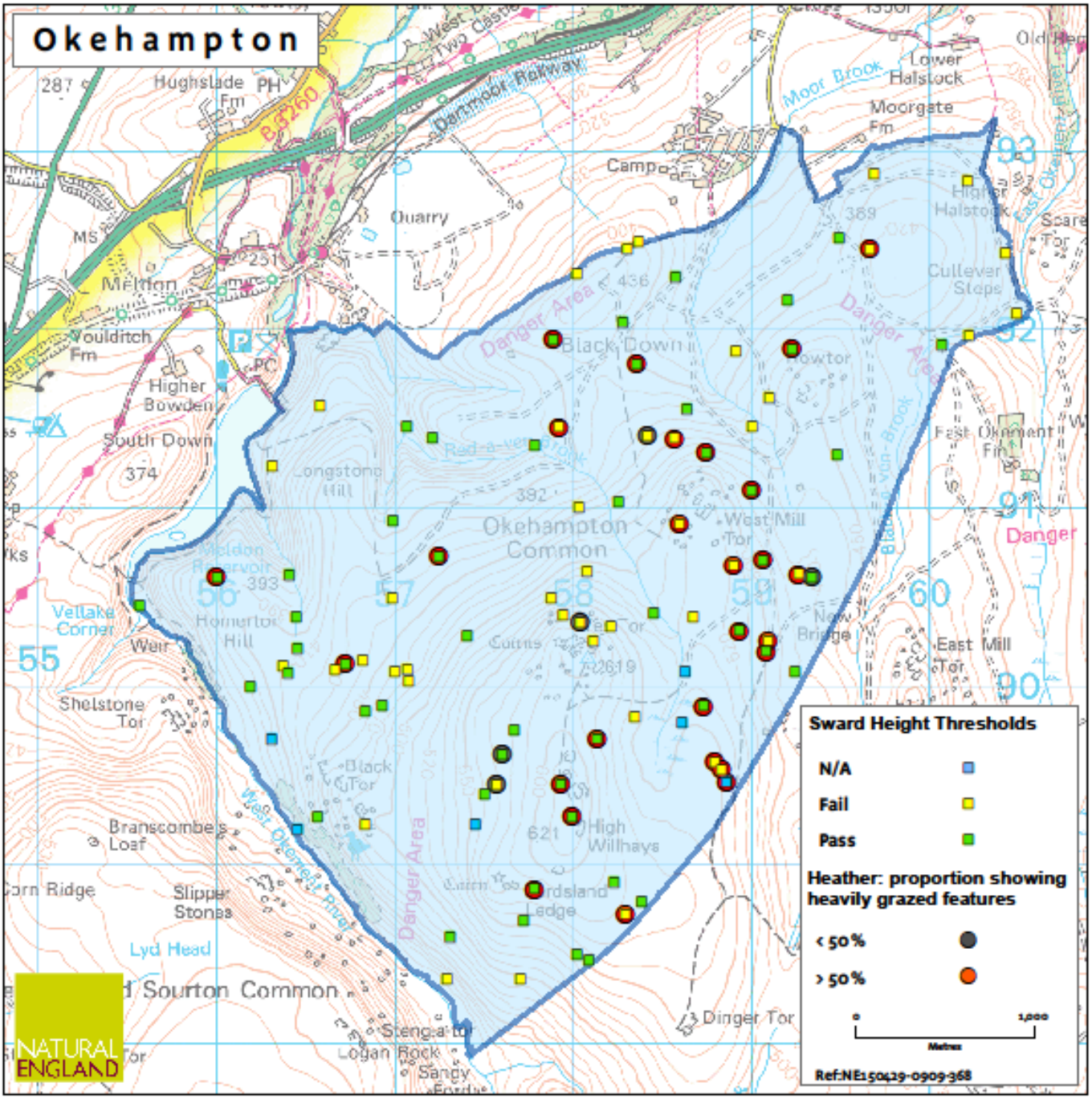
Target	**Pass or fail**
Cover of non-native species < 1%	Pass
Cover of native trees/ shrubs < 10%	Pass
Cover of negative indicators < 1%	Pass
Burning of bryophyte layer absent	Pass
Burning of sensitive areas absent	N/A
Extent of eroding peat	Pass
Disturbed bare ground < 10%	Pass

Indicator species frequencies (*n* = 21):

Species	**Frequency (%)**	**SD**		**Species**	**Frequency (%)**	**SD**
Calluna vulgaris	38	10.6		*E. vaginatum*	52	10.9
Erica tetralix	67	10.3		*Trichophorum cespitosum*	52	10.9
Erica cinerea	0	0.0		*Rhynchospora alba*	0	0.0
Vaccinium myrtillus	33	10.3		*Narthecium ossifragum*	0	0.0
Vaccinium oxycoccus	0	0.0		*Drosera* spp.	0	0.0
Vaccinium vitis-idaea	0	0.0		*Menyanthes trifoliata*	0	0.0
Rubus chamaemorus	0	0.0		*Sphagnum* spp.	81	8.6
Empetrum nigrum	0	0.0		*Racomitrium lanuginosum*	19	8.6
Myrica gale	0	0.0		Pleurocarpous mosses	90	6.4
Andromeda polifolia	0	0.0		Non-crustose lichens	10	6.4
Eriophorum angustifolium	90	6.4				



Map 1: Distribution of random sampling points on Okehampton Common 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 Okehampton Common 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** .

Report number RP01639 Number 14

ISBN 978-1-78354-398-4