A survey of waxcap grasslands in the West Pennine Moors pSSSI

a report for
Natural England

by
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1 INTRODUCTION

A large area of the West Pennine Moors is being considered by Natural England for designation as a Site of Special Scientific Interest (SSSI) based on its upland habitats and breeding bird assemblage. Fields within this area are also known to be good for their diversity of grassland fungi; notably the waxcap species *Hygrocybe* spp.. However, insufficient data exists to determine whether there is sufficient interest for the fungi assemblage to be considered as a reason for designation alongside the habitats and birds.

Waxcaps and other grassland fungi provide an indication of lack of improvement of grasslands over many years. They are most commonly associated with the National Vegetation Classification (NVC) communities MG5 *Cynosurus cristatus - Centaurea nigra* grassland, U4 *Fustuca ovina - Agrostis capilaris - Galium saxatile* grassland, CG1 *Festuca ovina - Carlina vulgaris* grassland and CG2 *Festuca ovina - Avenula pratensis* grassland; favour sites which are managed by grazing or frequent mowing to produce a short sward which may stimulate fruiting; and are commonly associated with mosses, notably *Rhytidiadelphus squarrosus* and *Pseudoscleropodium purum* (Griffiths *et al* 2002; see Rodwell 1992 for full NVC community descriptions). Sites rich in grassland fungi are scarce and threatened on a world scale. The Uk is a European stronghold for waxcap grasslands (Evans 2003) but they often occur on types of grassland which are botanically relatively poor and have thus been overlooked in the process of SSSI selection (Genny *et al* 2012). Some of the most important sites in the UK are in upland semi-natural grasslands where habitat loss has been lower (Evans 2003).

SSSI guidelines (Genny *et al* 2012) suggest that SSSI designation should be considered where 12 or more species of waxcap are found in a single visit or where 18 or more are found in multiple visits. The guidelines also recommend consideration of other indicators of important fungi grasslands where the waxcap targets are not met; the Clavariaceae, *Entoloma*, Geoglossaceae and *Dermoloma*. SSSI thresholds for total numbers of these species are suggested of 5, 12, 3 and 2 respectively for multiple visits. For these species, however, it is not considered that meeting the threshold for one of these groups solely would be sufficient, and the more genera/families in this list that exceed their respective threshold, the more confident one can be that the site is special. It is recommended that potential sites should be visited over at least three separate (but not necessarily consecutive) years and at different times during the fruiting season.

This report was commissioned by Natural England to carry out surveys at eight sites which had previously been identified as waxcap grasslands and also to investigate a further 17 sites where presence of waxcaps or potential habitat has recently been reported. The data obtained will provide the basis for assessment as to whether grassland fungi should be included as a reason for notification of the SSSI.

2 METHODS

Due to the lack of any expert mycological consultant available to undertake this work during the autumn of 2012, the author was employed to coordinate and assist with survey work using volunteer mycologists.

Because the SSSI designation needed to be considered this year (2012) and existing data is extremely limited, it has not been possible to make assessments over a series of years as is recommended. The original proposal for this work was that three survey visits should be made to known sites which would at least be spread over the autumn to cover the full fruiting season. It was also proposed that the survey would be based on assessment within 30 x 30 m quadrats to provide data which would be consistent with studies elsewhere (e.g. Griffiths *et al* 2006). However, delays in arranging access to the fields meant that survey work could not begin until mid-October - towards the end of the waxcap fruiting season - while the methodology for collection of data was simplified to a basic search of entire fields (or areas of appropriate habitat within fields) to ensure that volunteers could be called upon to carry out the work who were expert mycologists but not necessarily used to undertaking systematic survey work.

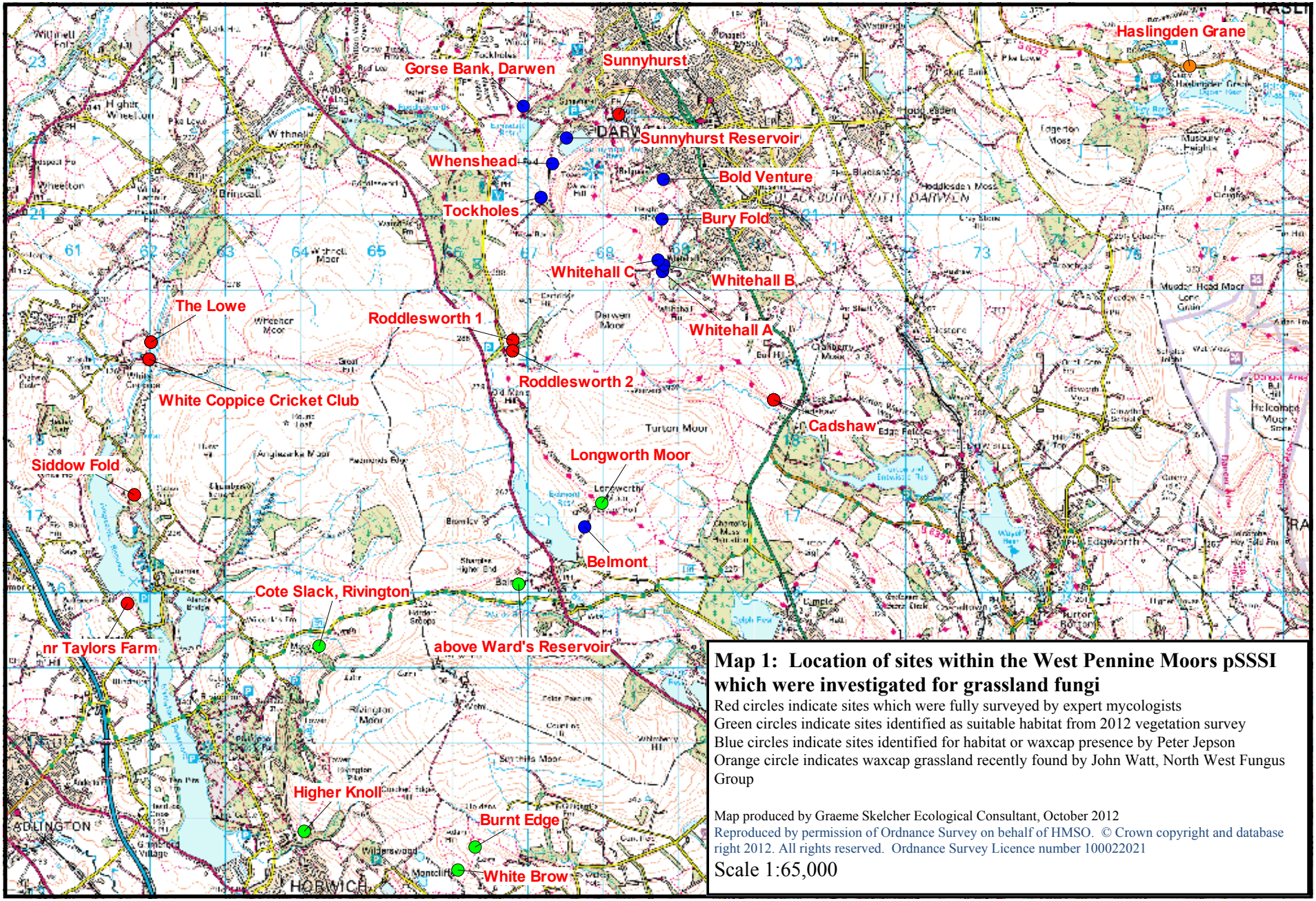
Experienced mycologists from the North West Fungus Group undertook survey work at the main eight sites. Tony Bond surveyed the White Coppice Cricket Club pitch and nearby field The Lowe. Jeanette Maddy surveyed Siddow Fold and Taylor's Farm by Anglezarke Reservoir and Tim Rogers surveyed two fields at Roddlesworth, one at Cadshaw and one at Sunnyhurst. Three visits were made to each of these sites between 18 October and 24 November 2012, except Siddow Fold and Taylor's Farm where only two visits were made due to illness during the final survey period, and the Sunnyhurst site where the habitat was judged by the surveyor to be unsuitable on the initial visit and no further visits were made.

Six fields where suitable habitat was identified from a recent vegetation survey of the potential SSSI (Penny Anderson Associates, 2012) were investigated for their fungi by Rich Burkmar and Ben Deed from Merseyside Biobank, with some additional assessment carried out by Tim Rogers. A further nine additional sites were investigated by the author, which had been identified by local ecologist Peter Jepson as either supporting potential habitat or having waxcaps recently seen. These sites were also visited between mid-October and the end of November.

Due to the lack of expertise in fungi identification amongst these latter surveyors, photographs of potentially interesting fungi encountered were distributed to Tim Rogers, Jeanette Maddy, Tony Bond and Ken Gartside, who gave their opinions on identification from the photographs. Two of the sites investigated by Rich Burkmar and Ben Deed which appeared from photographs to have some fungi interest were revisited by Tim Rogers.

A further site at Hasligden, just outside the pSSSI boundary, which came to light from a recent visit by John Watts, a member of the North West Fungus Group, was visited by Tim Rogers.

Access to sites was initially arranged by Natural England. In most cases unrestricted access was allowed for the purpose of carrying out this work, but some owners required further notification prior to visiting and an owner of one of the 'additional sites' required meeting on site in order to switch off an electric fence while the visit took place.



Map 1: Location of sites within the West Pennine Moors pSSSI which were investigated for grassland fungi

Red circles indicate sites which were fully surveyed by expert mycologists
Green circles indicate sites identified as suitable habitat from 2012 vegetation survey
Blue circles indicate sites identified for habitat or waxcap presence by Peter Jepson
Orange circle indicates waxcap grassland recently found by John Watt, North West Fungus Group

Map produced by Graeme Skelcher Ecological Consultant, October 2012

Scale 1:65,000

3 RESULTS

A total of 16 waxcap species were recorded in the fully surveyed sites (Table 1). The highest total over all visits at a single site was 8 (Siddow Fold and White Coppice Cricket Club), while the highest total for a single visit to a single site was also 8 (Siddow Fold on 19 October). No waxcap species were recorded at the Sunnyhurst site and only 1 species each was recorded at Cadshaw and the Lowe. These figures fall short of the recommended totals of 12 waxcap species required from a single visit and 18 from multiple visits for SSSI designation.

Other target grassland fungi species were recorded in the main surveyed sites (Table 2), but their diversity was generally very low. In total, across all of the main surveyed sites, 1 species of *Dermoloma*, 2 species of *Entoloma*, 1 species of *Trichoglossum* (Geoglossaceae) and 5 species of *Clavulinopsis* (Clavariaceae) were found. Only the combined number of *Clavulinopsis* species was sufficient to meet the recommended SSSI target (2, 12, 3 and 5 respectively) although 1 *Dermoloma*, 1 *Entoloma* and 3 *Clavulinopsis* species were found at the most productive waxcap site during this survey, Siddow Fold, which add to this site's importance at least locally.

Tables 3a - 3k provide summary data for each of these survey sites. Full survey sheets, as provided by the surveyors, are included in the Appendix to this report.

The additionally identified potential sites which were visited mostly supported at least some suitable habitat and often at least a few typical grassland fungi were found (Tables 4a - 4q). Waxcap species were recorded at five sites; Cote Slack, Higher Knoll, Burnt Edge, Whitehall A and Sunnyhurst Reservoir. However, no more than 3 species were found at any individual site (Sunnyhurst Reservoir banks being the most productive) and no new species were confirmed additional to those found in the main survey sites. The possibility of 2 additional species occurring (*H. glutinipes* at Cote Slack and *H. cantharellus* at Higher Knoll) was tentatively suggested by Ken Gartside based on photographs taken by Rich Burkmar at these sites on 21 October. However, these species were not found by Tim Rogers on a follow-up survey on 10 November and the fields were not considered worthy of any further investigation.

At Hasligden Grane, just outside the pSSSI, 5 species of waxcap were found in a single visit, but again none of these were in addition to the species found in the main survey.

Table 5 shows historical data for waxcaps and other target species collected by the North West Fungus Group for the White Coppice Cricket Club ground (provided by Tony Bond and Joyce Riley). These records show that 10 species of waxcap were recorded from the cricket pitch in November 2000, including *H. miniata* which was not recorded at any of the sites visited in 2012. In addition, *H. persistens* was recorded there in 1997, which also was not recorded in 2012. The 2000 list of waxcap species does not include *H. punicea* and *H. reidii* which were recorded at the cricket pitch in 2012. Thus, a total of 13 waxcap species have been recorded at this site since 1997.

Table 1: Waxcap species recorded at surveyed fields in the West Pennine Moors, autumn 2012
For numbers of waxcaps, 1 = 1 - 3; 2 = 4 - 9; 3 = 10 - 27; 4 = 28 - 81; and 5 = > 81

Site	White Coppice cricket club			The Lowe			Siddow Fold			Taylor's Farm			Roddles-worth 1			Rodles-worth 2			Cadshaw			Sunny-hurst			No. occasions each species recorded
Visit number	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
Species - *Hygrocybe*																									
H. calyptriformis																	1								1
H. ceracea	3	4	4				4	2																	5
H. chlorophana	4	4																							2
H. coccinea		4	4				1																		3
H. conica							2																		1
H. fornicata										3	2														2
H. insipid							1																		1
H. irrigata	3	4																							2
H. laeta						1	1	2			1		3		1	1									7
H. mucronella										1															1
H. pratensis	4	4					1	3		1	2		3	1		1	3		2		2				12
H. psittacina																1	1								2
H. punicea			4																						1
H. quieta													2												1
H. reidii		3					2			1			1			3									5
H. virginea		4					2	2							1	2	1	1							7
Total number of waxcap species recorded	**4**	**7**	**3**	**0**	**0**	**1**	**8**	**4**	**0**	**4**	**3**	**0**	**4**	**1**	**2**	**5**	**4**	**1**	**1**	**0**	**1**	**0**	**0**	**0**	**16**

Table 2: Other target fungi species recorded at surveyed fields in the West Pennine Moors, autumn 2012
For numbers of waxcaps, 1 = 1 - 3; 2 = 4 - 9; 3 = 10 - 27; 4 = 28 - 81; and 5 = > 81

Site	White Coppice cricket club			The Lowe			Siddow Fold			Taylor's Farm			Roddles-worth 1			Rodles-worth 2			Cadshaw			Sunny-hurst		
Visit number	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
CAMAROPHYLLOPSIS																								
Dermoloma cuneifolium								1																
ENTOLOMA																								
E. conferendum							1	2		1	1					2					2			
E. juncinum																					2			
CLAVARIA																								
CLAVULINA																								
CLAVULINOPSIS																								
Cp. corniculata										1	2													
Cp. fusiformis							1												3					
Cp. helvola							2																	
Cp. laeticolor							1																	
Cp. umbrinella																	1							
RAMARIOPSIS																								
GEOGLOSSUM																								
MICROGLOSSUM																								
TRICHOGLOSSUM																								
T. hirsutum																	1							

Table 3: Summary of habitats and species found at Surveyed Sites, West Pennine Moors 2012

Table 3a: Site 1 White Coppice Cricket Club

Site 1 White Coppice Cricket Club	
Grid-reference	361975 419075
Dates of survey	17/10/12, 1/11/12, 14/11/12
Site description Cricket field with close mown turf. Central square more intensively mown which is fertilised and therefore unlikely to contain waxcaps.	
Management Typical well-managed cricket field.	
Total number of waxcap species	8
Maximum number of waxcap species on a single visit (date)	7 (1/11/12)
List of waxcap species recorded *H. ceracea, H. chlorophana, H. cocinea, H. irrigata, H. pratensis, H. punicea, H. reidii, H. virginea*	
Other target species none	
Other recorded species none	
Surveyor	Tony Bond

Table 3b: Site 2 The Lowe, White Coppice

Grid-reference	362000 419300
Dates of survey	17/10/12, 1/11/12, 14/11/12
Site description Rough grazing which does not appear to have been grazed for some time, which has resulted in the area degenerating to rank grass.	
Management Apparently none for some time, making the area unsuitable for waxcaps even though they were found last year when droppings showed that it had been grazed.	
Total number of waxcap species	1
Maximum number of waxcap species on a single visit (date)	1 (14/11/12)
List of waxcap species recorded *H. laeta*	
Other target species none	
Other recorded species none	
Surveyor	Tony Bond

Table 3c: Site 3 Siddow Fold, Anglezarke

Grid-reference	361800 417280
Dates of survey	19/10/12, 14/11/12
Site description Field appeared to be mostly improved grassland. Species included Creeping buttercup, White clover, Rye grass, Crested dog's tail. Areas of rush along stream edges and near road. A small hill in the field had one side steep and with unimproved grassland including species such as Tormentil, Common bent, Heath bedstraw, Matt grass, Mosses (*Rhytidiadelphus squarrosus, Calliergonella cuspidata*?). This is where most of the fungi were found. Small amount of Creeping thistle and rush also present.	
Management Sheep grazed. Sward quite short.	
Total number of waxcap species	8
Maximum number of waxcap species on a single visit (date)	8 (19/10/12)
List of waxcap species recorded *H. ceracea, H. cocinea, H. conica, H. insipid, H. laeta , H. pratensis, H. reidii, H. virginea*	
Other target species *Dermoloma cuneifolium, Entoloma conferendum, Clavulinopsis fusiformis, Clavulinopsis helvola, Clavulinopsis laeticolor*	
Other recorded species *Coprinus sp.* (general appearance and cap cell structure suggest *tuberosa*), *Cystoderma amianthinum, Galerina sp., Panaeolus papilionaceus, Panaeolus acuminatus, Rickenella fibula*	
Surveyor	Jeanette Maddy

Table 3d: Site 4 nr. Taylor's Farm, Anglezarke

Grid-reference	361690 415843
Dates of survey	19/10/12, 14/11/12
Site description Field appeared to be mostly improved grassland and was on several levels. Species included Yorkshire fog, Fescue sp, Cock's foot, Rye grass, Crested dog's tail. Large area of rush to left of main path across field. As the edge of the field sloped down towards the reservoir the grassland became more unimproved including such species as Yarrow, Ribwort plantain, Bird's-foot trefoil, Wood rush. There were also a number of mossy hummocks. The mosses appeared to be *Rhytidiadelphus squarrosus* and *Calliergonella cuspidata* (?). Several CHEG species were noted in quite a small area.	
Management Sheep grazed. Sward medium.	
Total number of waxcap species	5
Maximum number of waxcap species on a single visit (date)	4 (19/10/11)
List of waxcap species recorded *H. fornicata, H. laeta , H. mucronella, H. pratensis, H. reidii*	
Other target species *Entoloma conferendum, Clavulinopsis corniculata*	
Other recorded species *Cystoderma amianthinum, Coprinus sp.*	
Surveyor	Jeanette Maddy

Table 3e: Site 5 Roddlesworth Field 1

Grid-reference	366789 419324
Dates of survey	18/10/12, 2/11/12, 23/11/12
Site description This is the northernmost field of the two sites near Roddlesworth. Unimproved acid pasture (U4?). Sheep grazing on the first two days of the survey and evidence of the recent presence of cattle. The upper areas, close to Conyries Plantation, are on steep slopes, which gradually become shallower towards the southern and western edges, which are dominated by soft rush *Juncus effusus* covering about a third of the site. Most of the fungi were found in the steeper areas. Most of the site faces SW to S, which would tend to make this a relatively warm site and therefore an early site for fungi. The peak of the appearance of waxcaps and other 'target species' is likely to have occurred before the first visit was made.	
Management The sward is relatively short, indicating regular grazing – no evidence of attempts at 'improvement'; this makes it a promising site for grassland fungi.	
Total number of waxcap species	5
Maximum number of waxcap species on a single visit (date)	4 (18/10/12)
List of waxcap species recorded *H. laeta , H. pratensis, H. quieta, H. reidii, H. virginea*	
Other target species none	
Other recorded species *Coprinopsis semitalis, Cordyceps militaris, Cystoderma amianthinum, Galerina pumila, Panaeolus acuminatus, Psilocybe semilanceata, Stropharia semiglobata, Stropharia pseudocyanea*	
Surveyor	Tim Rogers

Table 3f: Site 6 Roddlesworth Field 2

Grid-reference	366787 419186
Dates of survey	18/10/12, 2/11/12, 23/11/12
Site description Different in character from Field 1, apart from the upper slopes (less than 20% of the site), which resemble Field 1; most of the site, which again was being grazed by sheep, & is short-cropped, is less botanically diverse (almost entirely dominated by grasses) & appears to be closer to neutral in pH than Field 1 – the area close to the track at the western margin of the site is again dominated by soft rush.	
Management Grazed by sheep. Parts of the field may have been subject to 'improvement'; the sward is again closely grazed, but is not generally as promising as Field1. There is evidence of 'ridge & furrow' on the lower, flatter areas of the site, & quite a large area with molehills towards the SE corner, both indicating previous farming practice (& possible soil-enrichment) which is not associated with conditions suitable for waxcap grassland; this would explain why only the eastern & northern edges of the site (the former on steeply-sloping ground, the latter, near to the stream, with very uneven ground) are producing interesting fungi.	
Total number of waxcap species	6
Maximum number of waxcap species on a single visit (date)	5 (18/10/12)
List of waxcap species recorded *H. calyptriformis, H. laeta , H. pratensis, H. psittacina, H. reidii, H. virginea*	
Other target species	

Entoloma conferendum, Trichoglossum hirsutum	
Other recorded species *Clavulinopsis umbrinella , Cordyceps militaris, Cystoderma amianthinum, Stropharia pseudocyanea*	
Surveyor	Tim Rogers

Table 3g: Site 7 Cadshaw

Grid-reference	370244 418536
Dates of survey	18/10/12, 2/11/12, 24/11/12
Site description A small, south-facing field on a steep slope, well & evenly grazed (no livestock present); few fungi of interest have been found, but it looks to have some potential as wax-cap grassland. Botanically similar to Field 1 at Roddlesworth, i.e. probably U4, but not as diverse.	
Management Well and evenly grazed but no livestock present at time of survey. Quite distinct from surrounding grasslands, which look improved or semi-improved – probably because the steep slope makes any attempt at 'improvement' impractical.	
Total number of waxcap species	1
Maximum number of waxcap species on a single visit (date)	1 (18/10/12 & 24/11/12)
List of waxcap species recorded *H. pratensis*	
Other target species *Entoloma conferendum, Clavulinopsis fusiformis*	
Other recorded species *Entoloma juncinum, Cystoderma amianthinum, Coprinopsis semitalis, Galerina pumila*	
Surveyor	Tim Rogers

Table 3h: Site 8 Sunnyhurst

Grid-reference	368194 422311
Dates of survey	8/11/12
Site description Field marked for survey is partly planted up with trees and has not been grazed for some time (very lush grass, no chance of waxcaps). A close-cropped field below this, immediately to the east of Higher Sunnyhurst Farm, initially appeared to be more promising, but on further investigation was found to be unsuitable semi-improved grassland.	
Management partial plantation, currently ungrazed	
Total number of waxcap species	0
Maximum number of waxcap species on a single visit (date)	0
List of waxcap species recorded none	
Other target species none	
Other recorded species none	
Surveyor	Tim Rogers

Table 4: Summary of habitats and species found at Potential Sites, West Pennine Moors 2012

Table 4a: Site 9 Longworth Moor

Grid-reference	367967 417171
Date of survey	4/11/12
Site description Open, dry grassland but little fungal diversity. There appeared to be some good areas of bryophyte heath towards the NW end.	
Management Some apparent sheep grazing but much more being done by rabbits which were frequently encountered on site.	
Reason for consideration U4 grassland identified from 2012 NVC survey, Penny Anderson Associates	
Number of waxcap species	0
List of waxcap species recorded	
Other target species	
Other recorded species *Galerina* spp., *Psilocybe semilanceata*, possible *Clitocybe gibba*	
Surveyor	Ben Deed

Table 4b: Site 10 above Ward's reservoir, Belmont

Grid-reference	366867 416000
Date of survey	21/10/12
Site description Mostly very wet and dominated by Soft rush. A few small areas of relatively short (though not grazed) dry grass, though the larger sections of this appeared to have at least some nutrient enrichment based on the presence of nettles.	
Management Not grazed	
Reason for consideration U4 grassland identified from 2012 NVC survey, Penny Anderson Associates	
Number of waxcap species	0
List of waxcap species recorded	
Other target species possible *Entoloma* sp.	
Other recorded species *Panaeolus* sp., *Galerina* spp., *Psilocybe semilanceata*	
Surveyor	Ben Deed

Table 4c: Site 11 Cote Slack, Rivington

Grid-reference	364227 415280
Date of survey	21/10/12
Site description Short-sward grassland. Any *Juncus* there was clearly regularly cut or grazed and not dense.	
Management Grazed	
Reason for consideration U4 grassland identified from 2012 NVC survey, Penny Anderson Associates	
Number of waxcap species	1
List of waxcap species recorded *H. ceracea* or *H. glutinipes*	
Other target species none	
Other recorded species none	
Surveyor	Rich Burkmar

Table 4d: Site 12 Higher Knoll

Grid-reference	364029 412830
Date of survey	21/10/12
Site description Short-sward grassland	
Management	
Reason for consideration U4 grassland identified from 2012 NVC survey, Penny Anderson Associates	
Number of waxcap species	2?
List of waxcap species recorded Possible *H. cantharellus* plus *H. reidii* (or possibly *cocinea*)	
Other target species	
Other recorded species none	
Surveyor	Rich Burkmar

Table 4e: Site 13 White Brow

Grid-reference	366063 412317
Date of survey	20/10/12
Site description Short-sward grassland with large areas of rank *Juncus*.	
Management	
Reason for consideration U4 grassland identified from 2012 NVC survey, Penny Anderson Associates	
Number of waxcap species	0
List of waxcap species recorded none	
Other target species none	
Other recorded species none	
Surveyor	Rich Burkmar & Ben Deed

Table 4f: Site 14 Burnt Edge

Grid-reference	366291 412621
Date of survey	20/10/12
Site description Generally very rank grass and/or rushes with a smaller area of wet heath and sphagnum.	
Management	
Reason for consideration U4 grassland identified from 2012 NVC survey, Penny Anderson Associates	
Number of waxcap species	1 or 2
List of waxcap species recorded probable *H. pratensis*, possible *H. irrigata* or *Galerina* sp	
Other target species none	
Other recorded species *Galerina* (probably *mniophila*)	
Surveyor	Rich Burkmar & Ben Deed

Table 4g: Site 15 Belmont

Grid-reference	367741 416856
Date of survey	21/10/12
Site description Appeared to be typical unimproved grassland.	
Management Heavily sheep grazed	
Reason for consideration Potential habitat identified by Peter Jepson	
Number of waxcap species	not fully surveyed due to access misunderstanding
List of waxcap species recorded	
Other target species	
Other recorded species	
Surveyor	Ben Deed

Table 4h: Site 16 Whithall A, Darwen

Grid-reference	368771 420236
Date of survey	8/11/12
Site description Mostly rush pasture but with frequent pockets of long- and short-sward U4 acid grassland. Devils-bit scabious, lady's mantle and knapweed all present in the sward.	
Management Pasture but no stock present at time of survey.	
Reason for consideration Potential habitat identified by Peter Jepson	
Number of waxcap species	1
List of waxcap species recorded *H. pratensis* (c 11 at 368801 420200, 3 at 468749 420174 and 2 at 368762 420174)	
Other target species none	
Other recorded species *Galerina* sp.	
Surveyor	Graeme Skelcher

Table 4i: Site 17 Whithall B, Darwen

Grid-reference	368788 420320
Date of survey	8/11/12
Site description Short-sward U4 grassland with areas of rush. Access to this field could not be arranged so viewed only from the adjacent path and adjacent field (Site 18).	
Management Horse-grazed.	
Reason for consideration Potential habitat identified by Peter Jepson	
Number of waxcap species	not fully surveyed - unable to arrange access
List of waxcap species recorded none	
Other target species none	
Other recorded species none	
Surveyor	Graeme Skelcher

Table 4j: Site 18 Whithall C, Darwen

Grid-reference	368712 420386
Date of survey	8/11/12
Site description Mostly short-sward U4 grassland, very mossy in parts, along with some areas more improved grassland and rush pasture.	
Management Horse-grazed	
Reason for consideration Potential habitat identified by Peter Jepson	
Number of waxcap species	0
List of waxcap species recorded none	
Other target species none	
Other recorded species none	
Surveyor	Graeme Skelcher

Table 4k: Site 19 Bury Fold, Darwen

Grid-reference	368764 420926
Date of survey	8/11/12
Site description Pockets of U4 grassland within rush pasture on lower slope of hill below rush pasture, gorse scrub and other scrub.	
Management Pasture	
Reason for consideration Potential habitat identified by Peter Jepson	
Number of waxcap species	0
List of waxcap species recorded none	
Other target species none	
Other recorded species *Galerina* spp*., Coprinopsis* sp.	
Surveyor	Graeme Skelcher

Table 4l: Site 20 Bold Venture, Darwen

Grid-reference	368782 421454
Date of survey	8/11/12
Site description Short-sward U4 grassland with patchy heath. Very mossy in parts.	
Management Horse-grazed.	
Reason for consideration Potential habitat identified by Peter Jepson	
Number of waxcap species	0
List of waxcap species recorded none	
Other target species none	
Other recorded species none	
Surveyor	Graeme Skelcher

Table 4m: Site 21 Gorse bank, Darwen

Grid-reference	366928 422421
Date of survey	28/11/12
Site description Fairly rank grassland on sloping field. Probably mostly U4 acid grassland but some more improved grassland in patches. Boggy in parts, especially on the lower slope. Much of the upper slope covered in gorse scrub.	
Management Grazing by ponies (present at time of survey) and also sheep. Ponies on field from beginning of November but field is typically left ungrazed each summer prior to November.	
Reason for consideration Potential habitat identified by Peter Jepson	
Number of waxcap species	0
List of waxcap species recorded none	
Other target species *Entoloma conferendum* (1 at 366891 422419)	
Other recorded species none	
Surveyor	Graeme Skelcher

Table 4n: Site 22 Whenshead, Darwen

Grid-reference	367315 421661
Date of survey	28/11/12
Site description Mostly short-sward, semi-improved U4 acid grassland over slopping field, with some drier mounds and slightly boggier ground in between.	
Management Horse-grazed.	
Reason for consideration Potential habitat identified by Peter Jepson	
Number of waxcap species	0
List of waxcap species recorded none	
Other target species none	
Other recorded species probable *Coprinopsis semitalis, Stropharia semiglobata, Panaeolus* spp.(maybe *semiovatus* and *fimicola*)	
Surveyor	Graeme Skelcher

Table 4o: Site 23 Tockholes

Grid-reference	367164 421214
Date of survey	28/11/12
Site description Mosaic of short-sward U4 acid grassland and rush in upper parts. Generally more rank U5 and U2 acid grassland on lower slope towards stream.	
Management Grazed - probably by sheep but no stock present at time of survey.	
Reason for consideration Potential habitat identified by Peter Jepson	
Number of waxcap species	0
List of waxcap species recorded none	
Other target species none	
Other recorded species none	
Surveyor	Graeme Skelcher

Table 4p: Site 24 Sunnyhurst Reservoir

Grid-reference	367500 422000
Date of survey	28/11/12
Site description Mosaic of short-sward U4 acid grassland, more improved grassland and some heath on flat path alongside reservoir and steep bank below.	
Management Mown bank of reservoir.	
Reason for consideration Waxcaps observed by Peter Jepson, 2012	
Number of waxcap species	3?
List of waxcap species recorded probable *H. virginea (c* 12 at 367474 421978*) , H. conica (*1 at 367621 422111*);* possible *H. irrigata (*1 at 367486 422001*)*	
Other target species none	
Other recorded species *Galerina* spp.	
Surveyor	Graeme Skelcher

Table 4q: Site 25 Haslingden Grane

Grid-reference	375750 422950
Date of survey	24/11/12
Site description This is a large site, on steep, mostly south-facing slopes, consisting almost entirely of impoverished, unimproved grassland. It lies outside the proposed SSSI boundary (presumably the reason why it hasn't been spotted before), between Jamestone Quarry & Haslingden Grane Road (B6232), & between the stream west of Heap Clough, & the plantation beyond the house (on the Grane Road). This is not far from the boundary that encloses Oswaldtwistle Moor. Estimated to be about 450m long, & between 150 & 200m deep.	
Management Sheep pasture, currently grazed by a herd of about 30 sheep, and a few horses. From its topography, it appears it has always been pasture and is unlikely to have been subject to attempts at 'improvement'.	
Reason for consideration Recently identified as a waxcap site by John Watt, North West Fungus Group	
Number of waxcap species	5
List of waxcap species recorded *H. ceracea, H. laeta , H. pratensis, H. psittacina, H. virginea* [*H. conica, H. virginea* and an unidentified waxcap found in mid-October 2012 by John Watt]	
Other target species *Entoloma conferendum, Trichoglossom hirsutum*	
Other recorded species none	
Surveyor	Tim Rogers

Table 5: Historical data for target fungi species recorded at White Coppice Cricket Club, particularly in November 2000, by Joyce Riley and others

Species	Recorder	Date (Nov. 2000)	Most recent record
Clavulinopsis helvola	Joyce Riley	21/11/2000	
Entoloma conferendum	Joyce Riley	21/11/2000	21/12/2006
Hygrocybe calyptriformis	Joyce Riley	21/11/2000	
Hygrocybe ceracea	Richard Thompson	17/11/2000	
Hygrocybe chlorophana	Joyce Riley	21/11/2000	21/12/2006
Hygrocybe coccinea	Joyce Riley	21/11/2000	21/12/2006
Hygrocybe irrigata	Joyce Riley	21/11/2000	
Hygrocybe laeta	Joyce Riley	21/11/2000	21/12/2006
Hygrocybe miniata	Richard Thompson	17/11/2000	
Hygrocybe pratensis	Joyce Riley	21/11/2000	21/12/2006
Hygrocybe psittacina	Richard Thompson	17/11/2000	21/12/2006
Hygrocybe virginea	Joyce Riley	21/11/2000	
Hygrocybe persistens	Joyce Riley		24/10/1997

4 DISCUSSION AND CONCLUSIONS

The guideline target for SSSI status is that at least 12 species of waxcap should be recorded from a single visit or at least 18 species from multiple visits. Strictly adhering to these guidelines, the surveyed sites failed to meet either of these targets. In individual fields, the highest count both for a single visit (Siddow Fold) and in total over two or three visits (Siddow Fold and White Coppice Cricket Club) was just 8. Combining the five most productive fields (the above plus near Taylor's Farm and the two Roddlesworth fields), the total number of waxcap species recorded over the period from 18 October to the end of November was 16; still 2 short of the guideline total required.

However, there are some reasons why the results from this survey may not wholly reflect the full diversity of fungi species present:

- Firstly, the survey was conducted during just one year rather than over the recommended three. The summer of 2012 has been extremely wet, so there is every reason to suspect this might have impacted upon fungi growth and resulted in an atypical year for fruiting fungi. Griffiths *et al* (2002) cite studies which have shown more than ten-fold differences in number of waxcap species at individual sites between years. Irene Ridge (pers. com.), chair of the North West Fungus Group, stated on 30 October that 2012 seemed to be very patchy for waxcaps with very few being recorded from usually good sites elsewhere in Lancashire; while Martyn Ainsworth (pers. com.), Natural England fungi specialist, stated on 7 December that this had been a "dreadful" year for waxcap fruiting nationally, probably due to a lack of dry, warmer periods between the rainfall such that there was not the required sequence of events to encourage fruiting.

- Secondly, the survey started very late in the season. It was originally intended that work would begin in early September, but delays occurred in arranging access to the fields. Jeanette Maddy commented that it would have been useful to look at the sites in late September or early October to find earlier fruiting species, while Tim Rogers noted that Roddlesworth 1, for example, being a south-west to south facing site, was likely to produce waxcaps earlier in the season and thus the peak of the appearance of waxcaps and other target species was likely to have occurred before the first visit was made.

- Thirdly, some apparently previously good sites were clearly under poor management this year. Tony Bond had seen waxcaps in the Lowe in 2011, but in 2012 the field appeared to have been left ungrazed and only a single species of waxcap was found on just one of his three visits. The survey site at Sunnyhurst was judged to be unsuitable for waxcaps now and only one species of waxcap was found at Cadshaw (though an *Entoloma* and a *Clavulinops*is were also found here).

Given the above difficulties, the results from Siddow Fold, White Coppice Cricket Club, Taylor's Farm and the two Roddlesworth sites were at least promising and, of the other potential sites, the Sunnyhurst Reservoir site appears worthy of further investigation along with the newly discovered Haslingden Grane site.

No individual site came close to the SSSI criteria in 2012, though there is evidence that 10 waxcap species were present at the White Coppice Cricket Club in 2000 and a total of 13 species have been recorded here since 1997. While this covers a period of 16 years, it is extremely unlikely that there has been any significant change in management to the site over this time and thus all may still be present.

Combining the five best sites' results for 2012 gives a total number of 16 waxcaps recorded over the autumn, which is only two short of the total required for multiple visits. Moreover, if sites are combined and the visits made on the 17, 18 and 19 October can be considered as a 'single visit' (as undoubtedly any species found on these dates would have been visible at any time over the three-day period), the

total number of waxcaps found was 14, which is 2 more than the minimum requirement for a single visit. These sites lie up to 6 km apart on both the western and eastern margins of Anglezarke Moor, however, so do not form a very obvious unit together.

In addition to considerations of diversity, one of the species found at Roddlesworth 1 in 2012 and at White Coppice Cricket Club in 2000 was the pink waxcap *H. calyptriformis*. While this species is no longer considered to be uncommon in the UK (*cf.* Ing 1992 and Evans *et al* 2006) and was thus removed from the list of UK Biodiversity Action Plan priority species at the 2005-07 review (Biodiversity Reporting and Information Group 2007), it is included on a list of 33 fungi species which are threatened in Europe and have been recommended for inclusion on Appendix 1 of the Bern Convention (Dahlberg & Croneborg 2001 & 2003). *H. calyptriformis* is found in 22 European countries but is extremely rare across most of the continent and is included on the respective national Red List for 11 of these countries. The UK is now considered to be a European stronghold for this species and therefore has an international responsibility to maintain its populations.

If the West Pennine Moors was being considered for SSSI notification solely for its fungi, then undoubtedly it would be necessary to conclude that insufficient evidence was gathered from this survey to justify such designation, though enough was found to suggest that further investigation in future years would be beneficial. However, given that the proposal is to notify the SSSI anyway for its bird and upland habitat features, there does seem to be enough evidence to make a case for including grassland fungi as a supporting feature and seeking to secure positive management for grassland fungi within the pSSSI where appropriate habitat exists.

5 REFERENCES

Biodiversity Reporting and Information Group (2007) Report *on the species and habitats review*. Report to the UK Biodiversity Partnership.

Dahlberg A & Croneborg H (2001) *The 33 threatened fungi in Europe (Nature and Environment, No 136)*. T-PVS (2001) 34, Council of Europe, Strasbourg.

Dahlberg A & Croneborg H (2003) *33 threatened fungi in Europe: complementary and revised information on conditions for listing in Appendix 1 of the Bern Convention*. T-PVS (2001) 34 rev 2, EU DG.

Evans S (2003) Waxcap-grasslands - an assessment of English sites. *English Nature Research Report* **555**. English Nature, Peterborough.

Evans S, Hencrici A & Ing B (2006) The red data list of threatened British fungi - preliminary assessment. *http://www.fieldmycology.net/Download/RDL_of_Threatened_British_Fungi.pdf*

Ing B (1992) A provisional red data list of British fungi. *The Mycologist* **6** (3): 124–128

Genny DR, Hale AD, Woods RG & Wright M (2012) Chapter 18 Grassland Fungi. In JNCC *Guidelines for the selection of biological SSSIs*. http://jncc.defra.gov.uk/pdf/SSSIs_Chapter18.pdf

Griffiths G, Aron C, Evans DA, Evans S, Graham A, Holden L & Mitchel D (2006) Mycological survey of selected semi-natural grasslands in Wales. *CCW Contract FC-73-01-403*.

Griffiths G, Easton GL & Jones AW (2002) Ecology and diversity of waxcap (*Hygrocybe* spp.) fungi. *Botanical Journal of Scotland* **54**(1): 7-22.

Penny Anderson Associates (2012) *Vegetation survey of the West Pennine Moors pSSSI*. Unpublished report for Natural England.

Rodwell JS Ed. (1992) *British Plant Communities Volume 3: Grasslands and montane communities*. Cambridge University Press, Cambridge.