A survey of selected agri-environment grassland creation and restoration sites

Part 1 - 2010 survey

NATURAL ENGLAND

Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

Species-rich grassland is one of the glories of the English landscape. Having shrunk in extent by some 98% through the mid 20th century its protection became, from the outset of agri-environment schemes in the 1980s, a prime objective.

In the 1990s the agri-environment Research & Development programme began to find out how species-rich grassland can be re-created and restored. Research showed that grassland with a very wide range of species can be created on arable land, or restored from agriculturally improved grassland provided sufficient gaps are created for seed establishment. It also showed that almost all species-rich grassland is on soils low in available phosphorus and/or with other stress factors limiting competition from vigorous species.

These findings began to be fed into Classic Scheme delivery from the 1990s but in a limited way. When Environmental Stewardship was introduced in 2005 a much more targeted and pro-active approach was taken in the Higher Level Scheme with specific options for creation (HK8) and restoration (HK7) of species-rich grassland of BAP Priority quality.

This project was initiated in August 2010. The main driver was to find the best examples of creation and restoration so that we could demonstrate how close it is possible to get to the target habitat, in what timescale. We also hoped to identify the key ingredients for success.

This report is on part 1 of the project and did not sample soils to save time and money. As the project started in August the surveys of hay meadows and acid grassland were postponed until 2011 and the results of the 2011 surveys can be seen in part 2.

It is intended that the best examples of restored and recreated grassland will be written up as case studies to explain and illustrate how arable and improved grassland can be transformed into species-rich grassland. For example, what sites, methods and management practices have been the most successful.

This report should be cited as:

Acknowledgements

Contents

1. Executive summary

- This field survey aimed to to collect data from grassland sites on which Natural England local advisers believe that past and current agri-environment schemes have successfully facilitated the restoration and creation of BAP priority grasslands types.

- A short list of 25 candidate sites was drawn up by Natural England, and a total of 42 stands were surveyed across 24 different agreement holdings during September 2010.

- Information on past and current land management, creation and restoration techniques and agri-environment scheme history was obtained during a desk review, using telephone calls and emails to landowners, site managers and Natural England advisers. All advisers, landowners and site managers were also sent summary survey results for their site(s), together with a map showing the boundaries of the surveyed stands.

- The field methodology approximately followed that laid out in the Higher Level Stewardship Farm Environment Plan (FEP) Manual (Natural England, March 2010). All field data and descriptions were entered into an Excel spreadsheet and categorised using the keys in the FEP Manual for grassland type and condition. The boundaries of all surveyed stands and structured walk routes were digitised within MapInfo GIS and attributed accordingly.

- The majority of stands were on previously arable land, and only two sites were chosen on which older grassland was being restored.

- Management and agreement data was patchy and of variable quality and so it was not possible to say clearly which factors are most important for successful creation of semi-natural grassland, although well-designed schemes using wildflower mixes and brush-harvested seeds may do better in the time-scale examined than those relying on natural regeneration with or without a grass seed mix, even if close to existing species-rich grassland. Enthusiasm and commitment from the landowner probably also plays some significant part.

- According to Key 2a, two parcels supported improved grassland, while many more (22) were classified as semi-improved.

- Fewer stands were classified as semi-improved by Key 2b - six surveyed stands were semi-improved grassland, and of these, only one was species-poor. Of the rest, seven parcels were found to contain good quality Lowland Calcareous Grassland (G04, condition A).

- The sample contained a further five stands of condition B Lowland Calcareous Grassland and 13 in condition C.

- Of the eleven Lowland Meadows (G06) stands surveyed, only one was in condition A, with four in condition B and six in condition C (although two of these (one in condition B, and one in condition C) were classified as improved by Key 2a).

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(Editor's note: The intended method of using the FEP Manual [see in particular p56 and p62 in third edition, March 2010], and the one used in the 2011 follow-on to this project [NECR107 – Part 2], is:

- *(i) to use Key 2b only on swards which qualify as species-rich in Key 2a. In this project Key 2b was used on all stands. This greatly increased the number of stands classified as in conditions B and C)*

- *(ii) where swards qualify in Key 2a as species-rich but the frequency of indicator species is below the 'good condition' threshold, or where three indicator species are at least occasional [and not restricted to field edges and corners], they should be recorded as in condition C even if all other condition criteria are met. In this project these species criteria were treated the same as other condition criteria so in a small number of cases swards were classified as in condition B rather than C.*

- Overall agri-environment schemes have led to the successful creation of semi-natural grasslands, with many examples of grassland of good quality and in good condition developing on land which was previously under cultivation or intensive management. With time and continued appropriate management, it is expected that even more of these grasslands would develop into good quality BAP priority habitat, and could therefore be considered to be in 'recovering' condition.

- In many cases where the wildflower indicator attribute was not meet, there was usually a high diversity of indicator species present, even though the frequency of these species was not high enough to meet the threshold overall. This suggests that there might be some additional recovery potential, with the possibility that with time and appropriate management species may increase in frequency and enable the grassland to eventually meet the wildflower indicator attribute target.

- Recommendations are made for further investigation into the factors influencing the success of grassland creation/restoration schemes. It is also suggested that work should be undertaken to investigate how representative these sites are of the wider population of agri-environment grassland creation/restoration schemes.

- The results of this study could be used to demonstrate positive outcomes from the scheme to key stakeholders, policy makers, as well to inform updates of the grassland inventories; assist future BAP reporting; act as case studies of successful restoration and creation; and guide best practice for the future.

2. Introduction

Major objectives of the various agri-environment schemes have been, and still are, the maintenance, restoration and creation of valuable wildlife habitat, including lowland UK Biodiversity Action Plan (BAP) grasslands. Some studies have shown that grassland restoration and creation schemes can be successful, albeit slowly. However, much past monitoring of the schemes has focused mainly on pre-existing areas of habitat.

Natural England therefore commissioned this field survey to collect data from grassland sites on which Natural England local advisers believe that past and current agri-environment schemes have successfully facilitated the restoration and creation of grassland that conforms to a BAP priority habitat type.

The results of this survey will be used to inform updates of the grassland inventories; assist future BAP reporting; act as case studies of successful restoration and creation; and to guide best practice for the future.

3. Methodology

3.1. Preparations

A shortlist of 25 candidate sites was drawn up by Natural England staff, and further information on the exact location of the suggested land parcels/fields and landowner details sought from the relevant agri-environment scheme adviser(s) and other stakeholders.

An initial letter introducing the survey was sent to landowners from Natural England (see Appendix 1). This letter was followed by a telephone call from the surveyor, in which the date and time of the survey was arranged, together with any specific arrangements for access. At this time it was also checked whether all of the site had already been mown, in which case it was rejected from the survey at this stage. Acid grasslands were also to be excluded from the sample as it was considered too late in the season for survey of these grasslands.

Three sites were dropped from the original list (two because sufficient details could not be gained from the Natural England adviser, one because of dangerous livestock), although two of the remaining sites were split into two, on the recommendation of staff from the managing local wildlife organisations. One site (Site 2) was visited but no full survey completed, as no suitable habitat was present.

All contact with landowners and advisers was recorded within a communication record spreadsheet.

Prior to fieldwork blank field forms (see Appendix 2) and field maps were prepared. The surveyor also had a FEP Manual, suitable field equipment and identification guides.

3.2. Desk review

A desk review of information on past and current land management, creation and restoration techniques and agri-environment scheme history was obtained using telephone calls and emails to landowners, site managers and Natural England advisers following the survey in January 2011. The results may be found in section 4.5. All advisers, landowners and site managers were also sent summary survey results for their site(s), together with a map showing the boundaries of the surveyed stands.

3.3. Fieldwork

Fieldwork took place during September 2010, and approximately followed the method laid out in the Higher Level Stewardship Farm Environment Plan (FEP) Manual (Natural England, 2010b).

Each parcel of land selected for survey was walked over and brief descriptive notes made. Provisional stand boundaries of BAP priority grassland and good quality semi-improved grassland were then mapped. (Small (<0.25ha) fragments of grassland were not included unless they together added up to the Minimum Mappable Unit (MMU) area of 0.25ha, and component parts of mosaics were described but not mapped.) The classification of grassland type was confirmed later during the data analysis phase. Where possible all qualifying stands were surveyed in full using a structured walk, although where sites were large and/or complex, only a sub-sample

of stands was surveyed in this way. The justification for any sub-sampling was recorded on the form.

In six cases stands had been mown. However, since this was not known in advance of the visit, they were surveyed regardless, particularly as it was felt that a reasonable condition assessment could still be made (i.e. many indicator species were still visible). Other stands had been topped earlier in the year but were also still surveyed.

A structured walk of each selected stand then followed, with either 10 or 20 stops, depending on the size and variability of the stand. The approximate route of the walk was sketched on the field map. During this walk the frequency of wildflower indicator species was recorded, based on the number of stops, as described in the FEP Manual:

Frequency	10-stop walk	20-stop walk
Rare	1 to 2 stops	1 to 4 stops
Occasional	3 to 4 stops	5 to 8 stops
Frequent	5 or more stops	9 or more stops

Other attributes were assessed at a whole-stand level, namely:

- Cover of rye grass and white clover.
- Species richness/m^2 (estimate for the whole stand based on the richness of the first stop modified by observations during the rest of the survey).
- Cover of wildflowers and sedges (excluding white clover, creeping buttercup and injurious weeds).
- Cover of undesirable species.
- Cover of bare ground.
- Cover of invasive trees and shrubs.
- Cover of bracken.
- Cover of indicators of water-logging.
- Cover of large sedges.

In addition, a higher-plant species list was compiled for each stand, using a subjective estimate of frequency using the DAFOR of abundance where:

- D = Dominant.
- A = Abundant.
- F = Frequent.
- O = Occasional.
- R = Rare.

And the prefix 'L' indicated 'locally'.

A small number of representative photographs was also taken at each site.

3.4. Data analysis

3.4.1. Data entry

All field data and descriptions were entered into an Excel spreadsheet which included the following general fields ("stands" and "parcels" tabs):

- Date of survey.
- Site code.
- Site name.
- Photograph numbers.
- Parcels visited.
- Parcels/sub-parcels surveyed in full.
- Site/parcel descriptions.

The "species lists" tab contains all stand- and walk-level raw data, including stand/parcel DAFOR lists, together with workings to enable assessment using Keys 2a and 2b in the FEP Manual. The "summary" and "stand summary" display the data in a more summarised form.

Using the data from the structured walk and the walk-over together, each surveyed stand was then classified, using Keys 2a and 2b from the FEP Manual, into the following categories:

Key 2a:

- Species-rich grassland.
- Semi-improved grassland (G02).
- Species-poor improved grassland.

Key 2b:

- Good-quality species-rich grassland (G04-G08) e.g. "G04good" or "G06good".
- Moderate-quality species-rich grassland (G04-G08) "BAPmod".
- Good-quality semi-improved grassland "G02good".
- Species-poor semi-improved grassland "G02poor".

The condition of all good and moderate quality species-rich grasslands (according to Key 2b) was assessed using the targets in the FEP Manual. The grasslands were assessed against the targets for the grassland type for which the wildflower indicator was met. If Key 2b classified the grassland as a moderate quality species-rich grassland (i.e. the wildflower indicator target for any BAP grassland type was not met), or if the indicator target was met for more than one BAP grassland type, a subjective decision as to the most appropriate grassland type was made.

If all attributes were passed the grassland was in condition "A" (good), if only one attribute was failed the condition was "B"; if two or more attributes failed (or indicator species frequency criteria failed) the grassland was considered to be in condition "C".

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(i) to use Key 2b only on swards which qualify as species-rich in Key 2a. In this project Key 2b was used on all stands. This greatly increased the number of stands classified as in conditions B and C)

(ii) where swards qualify in Key 2a as species-rich but the frequency of indicator species is below the 'good condition' threshold, or where three indicator species are at least occasional [and not restricted to field edges and corners], they should be recorded as in condition C even if all other condition criteria are met. In this project these species criteria were treated the same as other condition criteria so in a small number of cases swards were classified as in condition B rather than C.

3.4.2. GIS digitising

The boundaries of all surveyed stands were digitised within MapInfo, to the relevant standards laid out in Natural England's *Digitising Standards for Habitat Inventories*, provided as Appendix 4 to the project specification. Polygons were attributed with:

- Site code.
- Site name.
- Parcel.
- Survey.
- Surveyor.
- Survey date.
- Habitat type.
- Comments.

The structured walk routes and target notes were also digitised.

4. Results

4.1. Results summary

A total of 42 stands were surveyed in full (see Table 1) and a summary may be found in Appendix 3. Appendix 4 shows data for additional parcels in which a full survey was not carried out.

Table 1: Summary of surveyed stands

Site	Parcel	Key 2b	Assessed as	Condition (A-C) / missed targets
1	2	G02poor	n/a	n/a
3a	1	BAPmod	G04	C Indicators, %wildflowers
3a	2	BAPmod	G04	C Indicators, %wildflowers
3b	1	G04good	G04	B %wildflowers
4	1	G04good or G06good	G04	A
4	2	G04good or G06good	G04	A
5	2	G02good	n/a	n/a
5	6	BAPmod	G04	C trees/scrub, indicators, %wildflowers
5	7	BAPmod	G04	C Indicators, %wildflowers
6	1	G04good or G06good	G04	A
6	2	G04good	G04	A
7	3	BAPmod	G04	C Indicators, %wildflowers
7	1(a)	G04good or G06good	G04	A
7	1(b)	BAPmod	G04	C Indicators, %wildflowers
7	2(a)	BAPmod	G04	C Indicators, %wildflowers
7	2(b)	G04good or G06good	G04	B %wildflowers
8a	1	G04good or G06good	G04	A
8b	1	BAPmod	G06	C Indicators, %wildflowers
9	1	BAPmod	G04	C Indicators
9	2	BAPmod	G04	C Indicators
10	1	G02good	n/a	n/a
11	1	BAPmod	G06	C Indicators, %widflowers
11	2	G06good	G06	B %wildflowers
11	3	G06good	G06	B %wildflowers
12	1	G04good or G06good	G04	A
13	1	G06good	G06	B %wildflowers
14	1	G06good	G06	A
15	1	G04good or G06good	G04	B %wildflowers
16	1	BAPmod	G06	C Indicators, %wildflowers
16	2	BAPmod	G04	C Indicators, %wildflowers
17	1	G02good	n/a	n/a
17	2 (a) and (b)	BAPmod	G04	C Indicators, %wildflowers
19	1(b)	G02good	n/a	n/a
19	1(c)	G02good	n/a	n/a
20	2+3	BAPmod	G06	C Indicators, %wildflower
20	4+5	G04good or G06good	G04	B %widflowers

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Site	Parcel	Key 2b	Assessed as	Condition (A-C) / missed targets
21	1	G04good	G04	B %wildflowers
21	2(a)	BAPmod	G04	C Indicators, %wildflowers
23	1 (a) to (d)	BAPmod	G04	C Indicators
25	1	BAPmod	G06	C Indicators
25	2	BAPmod	G06	C Indicators, %wildflowers
25	3	G06good	G06	B %wildflowers

Key 2b: Good-quality species-rich grassland (G04-G08) e.g. "G04good" or "G06good"; moderate-quality species-rich grassland (G04-G08) "BAPmod"; good-quality semi-improved grassland "G02good"; species-poor semi-improved grassland "G02poor"

4.2. Field survey results

According to Key 2b, only six surveyed stands were semi-improved grassland, and of these, only one was species-poor.

Of the rest, seven parcels were found to contain good quality Lowland Calcareous Grassland (G04, condition A). The sample contained a further five stands of condition B Lowland Calcareous Grassland, and 13 in condition C.

Of the eleven Lowland Meadows (G06) stands surveyed, only one was in condition A (site 14), with four in condition B (though only one failing the wildflower indicator attribute), and six in condition C.

It was felt that several of the lowland meadow grasslands in particular (sites 8b, 14, 16 (parcel 1) and 25) were calcareous in nature and it might also be appropriate to assess them as G04. However, this would not have improved or reduced their condition ranking.

Three parcels at site 11 were assessed as lowland meadow. However, it was felt that they were also close to Lowland Dry Acid Grassland (G05) in character (and consequently should not have been included in the sample).

4.3. Differences between Keys 2a and 2b

Approximately half of the stands (22) were defined as semi-improved grassland and two as improved grassland by Key 2a, but were classified as good/moderate quality species-rich grassland (G04 to G08 or "BAPmod") by Key 2b. These sites are shown below in Table 2.

Examination of Table 2 shows that in eight cases Key 2a classified the grassland as semi-improved but Key 2b classified it as a good-quality species-rich grassland, although with the wildflower cover attribute failed (resulting in condition B). In three of these eight cases the species richness was estimated to be 15 – i.e. on the very threshold for Key 2a.

Site 13 was improved according to Key 2a, because of a high cover of rye grass and white clover, relatively low species richness and wildflower cover. However it should be noted that this site was mown at the time of survey which may have skewed estimates of cover for this site.

In a further 16 sites Key 2a suggested semi-improved grassland but Key 2b found just enough wildflower indicator species were present to consider the sward to be BAP grassland, but not enough to pass the target for this attribute (condition C). In seven of these 16 cases the estimated wildlflower cover and/or species richness lay exactly on the threshold for Key 2a.

Table 2: Summary of stands which were improved/semi-improved according to Key 2a, but BAP type according to Key 2b

Site	Parcel	% RYE GRASS & CLOVER	SPECIES RICHNESS	% WILD-FLOWERS	Key 2a	Key 2b	Assessed as	Condition (A-C)
5	6	2	15	30	Semi-improved (G02)	BAPmod	G04	C trees/scrub, indicators, %wildflowers
5	7	1	15	15	Semi-improved (G02)	BAPmod	G04	C Indicators, %wildflowers
7	3	5	13	8	Semi-improved (G02)	BAPmod	G04	C Indicators, %wildflowers
7	1(b)	1	10	30	Semi-improved (G02)	BAPmod	G04	C Indicators, %wildflowers
7	2(a)	5	12	15	Semi-improved (G02)	BAPmod	G04	C Indicators, %wildflowers
11	1	1	13	3	Semi-improved (G02)	BAPmod	G06	C Indicators, %wildflowers
16	1	2	14	15	Semi-improved (G02)	BAPmod	G06	C Indicators, %wildflowers
16	2	5	15	30	Semi-improved (G02)	BAPmod	G04	C Indicators, %wildflowers
17	2	5	14	25	Semi-improved (G02)	BAPmod	G04	C Indicators, %wildflowers
20	2+3	60	12	8	Improved	BAPmod	G06	C Indicators, %wildflowers
21	2(a)	1	12	10	Semi-improved (G02)	BAPmod	G04	C Indicators, %wildflowers
25	2	25	10	15	Semi-improved (G02)	BAPmod	G06	C Indicators, %wildflowers
3a	1	10	15	12	Semi-improved (G02)	BAPmod	G04	C Indicators, %wildflowers
3a	2	5	15	20	Semi-improved (G02)	BAPmod	G04	C Indicators, %wildflowers
8b	1	1	12	5	Semi-improved (G02)	BAPmod	G06	C Indicators, %wildflowers
25	1	20	12	30	Semi-improved (G02)	BAPmod	G06	C Indicators
21	1	1	15	25	Semi-improved (G02)	G04good	G04	B %wildflowers
3b	1	2	15	20	Semi-improved (G02)	G04good	G04	B %wildflowers
15	1	8	12	15	Semi-improved (G02)	G04good or G06good	G04	B %wildflowers
20	4+5	1	10	20	Semi-improved (G02)	G04good or G06good	G04	B %wildflowers
11	2	1	13	3	Semi-improved (G02)	G06good	G06	B %wildflowers
11	3	1	15	8	Semi-improved (G02)	G06good	G06	B %wildflowers
13	1	40	8	10	Improved	G06good	G06	B %wildflowers
25	3	10	14	20	Semi-improved (G02)	GO6good	G06	B %wildflowers

Key 2a: Species-rich grassland; Semi-improved grassland (G02); Species-poor improved grassland. _Key 2b: Good-quality species-rich grassland (G04-G08) e.g. "G04good" or "G06good"; Moderate-quality species-rich grassland (G04-G08) "BAPmod"; Good-quality semi-improved grassland "G02good"_

4.4. Recovery potential

Of the sites which failed the attribute for frequency of widlflower indicator species, or which did not yet meet the definition of a priority grassland type according to Key 2b, an analysis of the number of indicator species present in the sward was made. The results may be found in Table 3 below. This shows that in many cases where the wildflower indicator attribute was not met, there was usually a high enough diversity of indicator species present, even though the frequency of these species was not high enough to meet the threshold overall. This suggests that there might be some additional recovery potential, with the possibility that with time and appropriate management species may increase in frequency and enable the grassland to eventually meet the wildflower indicator attribute target.

Table 3: Number and frequency of relevant grassland wildflower indicator species present in grasslands which failed the attribute for indicator species or did not meet the definition for a priority grassland type in Key 2b. For semi-improved grasslands, indicators from all priority grassland types have been combined

Site	Parcel	Grassland type (Key 2b)	Indicator summary
3a	1		4 (4R)
17	2 (a) and (b)		4 (2O + 2F)
16	2		4 (2R + 1O + 1F)
21	2(a)		5 (4R + 1F)
7	3		5 (2R + 2O + 1F)
5	7	G04	6 (4R + 2F)
3a	2	Lowland Calcareous Grassland	7 (3R + 1O + 3F)
7	2(a)		7 (6R + 1F)
7	1(b)	(Target = 2F+3O, 5 species)	8 (7R + 1O)
23	1		8 (7R + 1F)
5	6		9 (8R + 1O)
9	2		15 (11R + 3O + 1F)
9	1		15 (14R + 1F)
16	1		5 (2R + 3O)
8b	1		6 (2R + 2O + 1F)
20	2+3	G06 Lowland Meadow	6 (2R + 3O + 1F)
25	1		6 (3R + 3F)
25	2	(Target =2F+2O, 4 species)	7 (5R + 1O + 1F)
11	1		8 (5R + 1O + 2F)
17	1		3 (3R)
19	1(c)		4 (2R+1O+1F)
19	1(b)	G02 Good quality semi-improved grassland	4 (3R+1F)
5	2		4 (3R+ 1F)
10	1		6 (4R+1O+1F)
1	2	G02 Species-poor semi-improved grassland	7 (3R + 1O + 3F)

4.5. Site management

The site management information collected suggests that the majority of stands were established on previously-arable land, and were created through a variety of methods including natural regeneration, re-seeding and green hay.

Only two sites, both managed by a local Wildlife Trust, were known to be under agreements for restoration of existing grassland, and one parcel (parcel 7 at site 5) was discovered to be actually a remnant of older grassland. Parcel 6 at site 5 was natural regeneration on infilled quarry. Tables 4(a) to (d) summarise the management information for the remainder of the sites (i.e. those created onto previous arable land), categorised by condition category (A-C) and semi-improved grasslands, that is those which have not yet developed into a priority grassland type.

Examination of tables 4(a) to (d) suggests that time elapsed since the grassland was created did not appear to determine the condition of the created grassland, and some relatively recently created grasslands were in better condition than other longer established grasslands. Similarly, whether the arable has passed through a period of set aside prior to reversion is also not a clear factor in grassland creation success. However, it does appear to be the case that seed source may be important, and parcels which are re-seeded only with grass seed or left to natural regeneration tend to do less well than those which have received a wildflower mix or brush-harvested seed.

Tables 4(a) to (d) also show that all but one of these grassland creation projects were initiated under an agri-environment scheme of some kind, and all are now under such a scheme. It is noteworthy that the site that was re-seeded with rye-grass under the Habitat Scheme has not yet yielded any priority grassland habitat.

Seven parcels were solely reliant on natural regeneration to supply herb species to the new grassland, and of these all but the two parcels at site 5 were considered to be close to an existing old species-rich grassland as a seed source. Despite this proximity to a seed source, none of these sites passed the targets for wildflower indicator species, implying that natural regeneration is a slower process of gaining indicator species than directly introducing them.

Soil data proved very difficult to obtain, and in many cases advisers did not respond to requests for this data or said they did not have easy access to the data, sometimes because they were not in electronic format. Full pre-reversion soil data were available only for site 16. The advisers for sites 12 and 17 stated that soil data was not available at all.

Table 4(a): Summarised site management information for grasslands created on ex-arable land in <u>Condition A</u> (no attributes failed)

Site	Parcel	Years	Set aside first?	Creation method	Initial scheme	Current scheme	Current management
4	1	3	No.	Wildlflower seed mix.	HLS	HLS	Sheep and topping.
4	2	3	No.	Wildlflower seed mix.	HLS	HLS	Sheep and topping.
8a	1	4	No.	Brush-harvested seed and wildflower mix.	NONE	HLS	Sheep and cattle grazing, avoiding early summer. Some hay crops to reduce nutrients. RSPB.
6	2	6	3 years.	Wildlflower seed mix (locally sourced).	CSS	HLS	Sheep and cattle grazing. Butterfly Conservation.
14	1	7	1 year.	Green hay – two dates plus later additions.	CSS?	CSS?	Autumn grazing. Previously sheep, now cattle. Enthusiastic site manager.
6	1	13	Partial.	Wildlflower seed mix (locally sourced).	CSS	HLS	Autumn cattle grazing, with spring sheep grazing prior to 2007. Butterfly Conservation.
12	1	15		Grass seed mix and brush-harvested seed.	CSS	HLS	
7	1a	10	No.	Locally sourced brush-harvested seed supplemented with grass seed undersown barley.	CSS	HLS	Grazed and mown. Harvested to supply other creation schemes.

Showing years since first sown or managed as grassland, creation method (seed source), proximity to existing species-rich grasslands (based on surveyor judgement), initial agri-environment scheme, current agri-environment scheme and current management. Blank cell indicates information not available

Table 4(b): Summarised site management information for grasslands created on ex-arable land in <u>Condition B</u> (one failed attribute)

Site	Parcel	Years	Set aside first?	Creation method	Initial scheme	Current scheme	Current management
3b	1	12	Previous arable and grassland on rotation. Set-aside 7 years.	Grass seed and natural regeneration from a good natural seed bank.	CSS	HLS	Sheep grazed.
15	1	17	No.	Wildlflower seed mix.	CSS	CSS	Cattle, sheep and occasional hay cuts.
20	4 & 5	17			CSS	CSS	Horse grazed.
21	1	17		Sown with downland grasses. Herbs sown and planted.	CSS	CSS	Late autumn grazing, plus heavy rabbit grazing locally. Enthusiastic landowner.
25	3	17		Wildlflower seed mix.	CSS	CSS	Mowing and sheep grazing. Possibly some light FYM.
13	1	20	No.	Wildlflower seed mix.	CSS	HLS	Cattle grazing and hay cut.
7	2b	10	No.	Locally sourced brush-harvested seed supplemented with grass sown under barley.	CSS	HLS	Grazed and mown. Some topped. Harvested to supply other creation schemes.

Showing years since first sown or managed as grassland, creation method (seed source), proximity to existing species-rich grasslands (based on surveyor judgement), initial agri-environment scheme, current agri-environment scheme and current management. Blank cell indicates information not available

Table 4(c): Summarised site management information for grasslands created on ex-arable land in <u>Condition C</u> (>1 failed attribute, or indicator species target failed)

Site	Parcel	Years	Set aside first?	Creation method	Initial scheme	Current scheme	Current management
3a	2	18	No?	Grass mix and brush-harvested seeds	CSS	CSS	Sheep and cattle grazing. Wildlife Trust.
3a	1	18		Natural regeneration and brush- and hand-harvested seeds.	CSS	CSS	Sheep and cattle grazing. Wildlife Trust.
7	3	10	No.	Locally sourced brush-harvested seed supplemented with grass seed sown under barley.	CSS	HLS	Grazed and mown.
7	2a	10	No.	Locally sourced brush-harvested seed supplemented with grass seed sown under barley.	CSS	HLS	Grazed and mown. Some topped.
7	1b	10	No.	Locally sourced brush-harvested seed supplemented with grass seed sown under barley.	CSS	HLS	Grazed and mown.
8b	1	6	No.	Grasses only, then green hay and wildflower seed mix later. Additional yellow rattle seed.	CSS	CSS	Sheep grazing. Also some mowing to reduce nutrient levels. RSPB.
9	2	7	No.	Wildlflower seed mix.	ESA	ESA	Sheep and cattle grazing. Wildlife Trust.
9	1	7	No.	Wildlflower seed mix.	ESA	ESA	Sheep and cattle grazing. Wildlife Trust.
16	2	6?	Grass-seeded.		CSS	CSS	Sheep and cattle grazed. Wildlife Trust.
16	1	6?			CSS	CSS	Sheep and cattle grazed. Wildlife Trust.
17	2	17		Previously non-intensive cereal and grass rotation. Grass seed mix and natural regeneration.	ESA	HLS	Sheep and cattle.
20	2 & 3	17			CSS	CSS	Horse grazed.
21	2	20			CSS	CSS	Unmown.
23	1	4	Set aside 5 years.	Natural regeneration.	HLS	HLS	Autumn sheep grazing.
25	2	17		Wildlflower seed mix.	CSS	CSS	Mowing and sheep grazing. Possibly some light FYM.
25	1	17		Wildlflower seed mix.	CSS	CSS	Mowing and sheep grazing. Possibly some light FYM.

Showing years since first sown or managed as grassland, creation method (seed source), proximity to existing species-rich grasslands (based on surveyor judgement), initial agri-environment scheme, current agri-environment scheme and current management. Blank cell indicates information not available

Table 4(d): Summarised site management information for grasslands created on ex-arable land which have not yet developed in BAP priority grassland types

Site	Parcel	Years	Set aside first?	Creation method	Initial scheme	Current scheme	Current management
5	2	10	7 years.	Natural regeneration, possibly with grass seed.	CSS	HLS	Cattle grazed and scrub control.
1	2	13		Green hay?	CSS	HLS	Sheep and cattle grazing permitted. NT owned.
17	1	17		Previously non-intensive cereal and grass rotation. Grass seed mix and natural regeneration.	ESA	HLS	Sheep and cattle.
19	1b	17	No.	Sown with rye grass.	Habitat Scheme	Habitat Scheme	Mown.
19	1c	17	No.	Sown with rye grass.	Habitat Scheme	Habitat Scheme	Mown every 3-4 years.

Showing years since first sown or managed as grassland, creation method (seed source), proximity to existing species-rich grasslands (based on surveyor judgement), initial agri-environment scheme, current agri-environment scheme and current management. Blank cell indicates information not available.

5. Project outputs

The following electronic outputs are provided:

- Project report (in Word and pdf format).
- GIS layers (stand boundaries and walk routes).
- Excel spreadsheet with full field data.
- Excel landowner/adviser contact record spreadsheet.
- Excel site management information spreadsheet.
- Digital photograph files.
- Directory containing all collated documents and maps containing site information.

6. Discussion

A full survey was undertaken on 42 different grassland stands. Of these, only six stands were semi-improved/improved grassland according to Key 2b (and two improved according to Key 2a), with the rest supporting species-rich BAP grassland types, some in condition category A, others failing one or two attributes and most of the rest with a sufficient diversity of wildflower indicator species to suggest some further recovery potential. Although not a random-sample survey and hence not necessarily representative, this survey nevertheless shows many clear examples of successful creation of grassland conforming to BAP priority types on previously-arable or intensively managed land.

Management and agreement data was patchy and of variable quality and so it is not possible to say clearly which factors are most important for successful creation/restoration of semi-natural grassland, although well designed schemes using wildflower mixes and brush-harvested seeds may do better in the timescale examined than those relying on natural regeneration with or without a grass seed mix, even if close to existing species-rich grassland. Enthusiasm and commitment from the landowner probably also plays some significant part. On several of the sites visited, the landowners were extremely keen and proud of the work they had been doing. Some went to great lengths to hand sow in new species each year, and one had even developed his own method of protecting developing turf with wire frames (Site 21). Many other interacting factors, including nutrient status and management, are likely to be important, but insufficient detailed information was available to make an assessment of them.

All but one of these grassland creation projects were initiated under an agri-environment scheme of some kind, and all are now under such a scheme; either an original 'classic' scheme or HLS.

In general the FEP Manual field method was clear and easy to follow. However, there were some differences in the classification of grasslands using Key 2a and 2b, due to the use of different attributes in the two Keys. It was therefore possible for a stand to be considered semi-improved or improved in Key 2a, but not Key 2b, particularly when there was a reasonable range of indicator wildflower species present, even if not frequent enough to pass the condition assessment threshold (moderate quality species-rich grasslands). In some cases the various attribute estimates were near the Key 2a threshold level, so such estimates were particularly important, although sometimes were difficult to assess objectively, and accuracy may have been affected by lateness in the survey season and in mown or short-grazed swards. Therefore, for the purposes of the analysis in this report, Key 2b was used as the primary classification. This may be justifiable if the presence of indicator species is considered to be more robust against factors of survey season, sward height and subjectivity than the Key 2a attributes. *(Editor's note: The intended method of using the FEP Manual, and the one used in the 2011 follow-on to this survey [NECR   ], is to use Key 2b only on swards which qualify as species-rich in Key 2a.)*

In cases where the wildflower indicator target for any BAP grassland type was not met, or if the indicator target was met for more than one BAP grassland type, a subjective decision as to the most appropriate grassland type was made. In a few other cases, where a single indicator target was met, the grassland was therefore assessed as a type other than the one that seemed most appropriate according to the dominant grasses or site topography. The most significant of these cases is site 14 (lowland meadow in condition A), which was dominated by *Bromopsis erecta*, but

a calcareous grassland assessment would have dropped the condition to condition B (as the targets for calcareous grassland indicators would not be met).

In six cases stands had been mown. However, since this was not known in advance in advance of the visit, they were surveyed regardless, particularly as it was felt that a reasonable condition assessment could still be made (that is many indicator species were still visible). It is probable that survey earlier in the year would have avoided this issue. The lateness of season also caused some difficulty in species identification, particularly in short-grazed swards.

Overall agri-environment schemes have facilitated successful creation of semi-natural grasslands, with many examples of good quality and good condition grassland stands developing on land which was previously under cultivation or intensive management. With time and continued appropriate management, it is expected that even more of the grasslands could develop into good quality BAP priority habitat and condition.

7. Recommendations for further work

Recommendations for further work follow:

- Further investigation into past and current site management using paper and electronic documents associated with the relevant agri-environment agreements.
- Conduct a random-sample study based on new survey or examination of other existing surveys to investigate how representative these sites are of the wider population of agri-environment grassland creation/restoration schemes.
- Prepare 'success story' case-studies and use these to inform best practice.
- Update the habitat inventories with any new BAP grassland polygons.
- Consider reviewing Keys 2a and 2b.

8. Reference

HEWINS, E., PINCHES, C. & COOKE, A. I. 2012 . Creation of species-rich grassland: evidence for effectiveness of Environmental Stewardship. *Aspects of Applied Biology 115, Restoring diverse grassland: what can be achieved where, and what will it do for us? Pp 89-96.*

KIRKHAM, F.W., DAVIS, D., FOWBERT, J.A., HOOKE, D., PARKIN, A.B., & SHERWOOD, A.J. 2006. *Evaluation of arable reversion agreements in the Countryside Stewardship and Environmentally Sensitive Areas Scheme.* Report to Defra (project MA01015).

NATURAL ENGLAND 2010. *Higher Level Stewardship Farm Environment Plan (FEP) Manual, third edition.*

STEVENS, P & WILSON, P. 2012 . Species-rich grassland re-creation projects: a route to success? *Aspects of Applied Biology 115, Restoring diverse grassland: what can be achieved where, and what will it do for us? Pp 53-60.*

Appendix 1: Landowner letter

Dear [insert name],

Identification of sites successfully created or restored to BAP Priority Grassland habitat

The restoration and creation of species-rich grassland is a major objective of agri-environment schemes, and one of the most difficult to achieve. Natural England is keen to identify sites which have been successfully restored, first so that we can add them to our Inventory of BAP (Biodiversity Action Plan) Grassland and second so that we may use them as case studies to demonstrate the effectiveness of the schemes.

One or more parcels on your holding have been identified by our advisers as potential successes and we have contracted Hewins Ecology to visit each parcel in September 2010 to carry out a botanical survey.

There is no need to respond directly to this letter. Dr Eleanor Hewins will contact you soon to ask permission for the survey to be conducted on your land and to arrange a suitable date.

I'd be very happy to discuss this with you if you wish - please ring or email me. Thank you in advance for your cooperation.

Yours sincerely

Stephen Peel
Senior Specialist, Agroecology,
Natural England
Leeds

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Appendix 2: Field form

Date:	...... September 2010	Site name:	
HE Site code:		Parcel ID:	
Photos:		1km grid squares:	

Grassland type (circle): (see also summary crib sheet). **Description over-leaf**

Good quality/moderately spp rich semi-improved (G02)	LCG (G04)	LDAG (G05) : DO NOT SURVEY
LM (G06): DO NOT SURVEY IF MOWN THIS YEAR	PMGRP (G07)	None present

Structured walk 1m^2 stops (10cm x 10cm = 1%)

Indicators	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Site est.	DAF OR
% rye grass/white clover																						
Species richness																						
% wildflowers[1]																						
% undesirable species[2]																						
% bare ground																						
% trees and scrub																						
% water-logging[3] indict. (LM)																						
% Large sedges (PMGRP)																						
% Large grass (PMGRP)																						
% Nonjoint rush (PMGRP)																						

DAFOR list for the stand: (include stop tally for SI grassland positive indicators)

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1 Including sedges and rushes, but excluding white clover, creeping buttercup and injurious weeds

2 Creeping thistle, spear thistle, curled dock, broad-leaved dock, common ragwort, common nettle, (plus marsh ragwort, cow parsley and bracken in LM) (plus cow parsley, marsh thistle and marsh ragwort in PMGRP)

3 Large sedges, rushes and reeds

Appendix 3: Field data summary – fully surveyed stands

Site	Parcel	Description	No of stops	% RYEGRASS/CLOVER	SPECIES RICHNESS/m^2	% WILDFLOWERS	% UNDESIRABLE SPECIES	% BARE GROUND	% TREES and SCRUB	Key 2a	Key 2b	Assessed as	Condition (A-C) missed targets
1	2	Sheep grazed at time of survey. Large ex-arable field. Mostly herb-rich with abundant wild carrot throughout. Excluded area was dominated by longer grass, and was species poor, with interest limited to very occasional wild carrot. Also frequent thistles in this area.	20	5	7	50	<1	<1	<1	Species-rich	G02poor	n/a	n/a
3a	1	Most of this field was surveyed, and is developing well into CG3-5, with *Bromopsis erecta* and *Brachypodium pinnatum* throughout. The field edges were less good, more mesotrophic with fewer indicators as well as more white clover (excluded). Few small anthills. Thistles very localised.	10	10	15	12	<1	<1	<1	Semi-improved (G02)	BAPmod	G04	C Indicators, % wildflowers
3a	2	This field contained two separate areas of reverted grassland, separated by presumably pre-existing banks (excluded). The areas were slightly different in terms of grass species composition, but similar in terms of indicator species. The southern area has more *Bromopsis erecta* and *Brachypodium pinnatum*.	10	5	15	20	<1	<1	<1	Semi-improved (G02)	BAPmod	G04	C Indicators, % wildflowers
3b	1	Large ex-arable field. Variable sward structure/herb richness/dominance of false oat-grass. However, positive indicator species throughout and so field assessed as a single stand. Barrow excluded as assumed it has never been cultivated.	20	2	15	20	<1	<1	<1	Semi-improved (G02)	G04good	G04	B % wildflowers
4	1	Large, fairly uniform herb-rich field. Lower slopes less rich, but still with indicators and so included in stand. The extreme bottom of field was excluded.	10	1	15	60	<1	<1	<1	Species-rich	G04good or G06good	G04	A none
4	2	Fairly uniform and herb-rich. The flattest western part of the field was excluded as indicators much less frequent here: herb cover patchy (5-20%), species richness = 8 and clover/rye grass 10%. However, the two areas blend quite gradually and it was difficult to draw a clear boundary.	10	1	15	70	<1	<1	<1	Species-rich	G04good or G06good	G04	A none

Site	Parcel	Description	No of stops	% RYEGRASS/CLOVER	SPECIES RICHNESS/m^2	% WILDFLOWERS	% UNDESIRABLE SPECIES	% BARE GROUND	% TREES and SCRUB	Key 2a	Key 2b	Assessed as	Condition (A-C) missed targets
5	2	Large, mostly flat field. Interest is patchy, but *Lotus corniculatus* found scattered throughout.	10	15	15	20	<1	<1	<1	Semi-improved (G02)	G02good	n/a	n/a
5	6	Very large field with much young hawthorn scrub. Fairly variable, but assessed as a single stand. Areas of dense grass, open ground and a long bank with highest species diversity. Shallow soil with limestone rocks exposed in many parts.	20	2	15	30	1	1	7	Semi-improved (G02)	BAPmod	G04	C trees/scrub, indicators, % wildflowers
5	7	Small area of LCG, which appears mown – structured walk done on this area only. See map for other areas of SI/I mosaic (grass dominated, part tall fescue, with herbs such as vetch and clover to edges only). Also area of scattered scrub in an unmanaged grassy matrix (with calcareous indicators, including yellow-wort, knapweed and wild carrot). Herb richness variable, only herb-rich locally. Also mature dense scrub.	10	1	15	15	<1	<1	<1	Semi-improved (G02)	BAPmod	G04	C Indicators, % wildflowers
6	1	Linear, sloping ex-arable field above the A31 main road. Herb- and indicator-rich throughout, though the flatter upper slopes have a ranker structure and more false oat-grass.	20	1	14	50	<1	<1	<1	Species-rich	G04good or G06good	G04	A none
6	2	Long linear field, very gently sloping. Coarse structure. Fairly uniform.	20	1	16	40	<1	<1	<1	Species-rich	G04good	G04	A none
7	3	Large ex-arable field. Only unmown parts (ie one side of the valley) assessed.	10	5	13	8	<1	<1	<1	Semi-improved (G02)	BAPmod	G04	C Indicators, % wildflowers

Site	Parcel	Description	No of stops	% RYEGRASS/CLOVER	SPECIES RICHNESS/m^2	% WILDFLOWERS	% UNDESIRABLE SPECIES	% BARE GROUND	% TREES and SCRUB	Key 2a	Key 2b	Assessed as	Condition (A-C) missed targets
7	1(a)	Field 6263. Huge (approx. 20ha) ex-arable field. Grazed by heifers at time of survey. Three blocks left unmown, the rest was mown in July. Unmown areas rotate each year. Unmown areas are brush-harvested to supply seed for other schemes. All areas herb-rich, but given size of field, a sub-sample of two of the umown areas was taken (a) and (b) – 10 stops in each. (The landowner said that this would still be representative of the whole field). Area (a) was richer, and on the steeper ground The third unmown area (c) was similar to block (a) but also contained autumn gentian.	10	1	16	70	<1	<1	<1	Species-rich	G04good or G06good	G04	A none
7	1(b)	Field 6263. Huge (approx 20ha) ex-arable field. Grazed by heifers at time of survey. Three blocks left unmown, the rest was mown in July. Unmown areas rotate each year. Unmown areas are brush-harvested to supply seed for other schemes. All areas herb-rich, but given size of field, a sub-sample of two of the umown areas was taken (a) and (b) – 10 stops in each. (The landowner said that this would still be representative of the whole field). Area (a) was richer, and on the steeper ground The third unmown area (c) was similar to block (a) but also contained autumn gentian.	10	1	10	30	<1	<1	<1	Semi-improved (G02)	BAPmod	G04	C Indicators, % wildflowers
7	2(a)	This field was divided into the bank (assumed never cultivated, not surveyed), west end (farmer suggested also never cultivated) and the rest. Of the rest, the western end (b) is most improved, with some scattered indicators, with a transition to more indicators to the east (a). Both (a) and (b) were assessed, 10 stops each.	10	5	12	15	<1	<1	<1	Semi-improved (G02)	BAPmod	G04	C Indicators, % wildflowers
7	2(b)	This field was divided into the bank (assumed never cultivated, not surveyed), west end (farmer suggested also never cultivated) and the rest. Of the rest, the western end (b) is most improved, with some scattered indicators, with a transition to more indicators to the east (a). Both (a) and (b) were assessed, 10 stops each.	10	1	16	20	<1	<1	<1	Species-rich	G04good or G06good	G04	B % wildflowers
8a	1	Huge flat field. Fairly uniform. Tall herby structure. One fenced enclosure (excluded).	20	1	16	50	<1	<1	<1	Species-rich	G04good or G06good	G04	A none

Site	Parcel	Description	No of stops	% RYEGRASS/CLOVER	SPECIES RICHNESS/m²	% WILDFLOWERS	% UNDESIRABLE SPECIES	% BARE GROUND	% TREES and SCRUB	Key 2a	Key 2b	Assessed as	Condition (A-C) missed targets
8b	1	Only the bottom of the two main RSPB fields done (field 1) as this is the best according to the RSPB officer. However, is grazed with adjacent (top) field (field 2). Some difficulty with species identification and abundance assessment due to heavy grazing and lateness of season.	20	1	12	5	<1	<1	<1	Semi-improved (G02)	BAPmod	G06	C Indicators, %wildflowers
9	1	Two uniform fields surveyed (1 and 2). (There is also another small northern field which is similar, but was not surveyed). Species-rich and herb-rich.	10	1	16	40	<1	<1	<1	Species-rich	BAPmod	G04	C Indicators
9	2	Similar to field 1, though possibly more indicators.	10	1	16	40	<1	<1	<1	Species-rich	BAPmod	G04	C Indicators
10	1	One of a series of connected fields. Probably MG5/LM type. Uniform height, but herb-richness/diversity varies, and *Juncus conglomeratus* occurred in a cluster only.	10	8	9	10	2	<1	<1	Semi-improved (G02)	G02good	n/a	n/a
11	1	Grazed with field 2. A small bracken fringed field. Unmown. Scattered anthillsAcid in character.	10	1	13	3	<1	<1	<1	Semi-improved (G02)	BAPmod	G06	C Indicators, % wildflowers
11	2	Grazed with field 1. A small bracken fringed field. Unmown. Acid in character.	10	1	13	3	<1	<1	<1	Semi-improved (G02)	G06good	G06	B % wildflowers
11	3	Similar to fields 1 and 2, but larger, with occasional clumps of bracken (1%) and western gorse (2%). Acid in character.	20	1	15	8	<1	<1	<1	Semi-improved (G02)	G06good	G06	B % wildflowers
12	1	A diverse and herb-rich grassland. Large south-facing moderately sloping field. Fairly homogenous, with large numbers of indicator species throughout. Not mown this year – fairly long sward. Not sure if cattle or other stock ever graze the field. Surrounded by beech woods.	20	2	18	75	<1	<1	<1	Species-rich	G04good or G06good	G04	A none
13	1	Very short mown, but still herb-rich and a full survey done. Probably MG5b.	10	40	8	10	<1	<1	<1	Improved	G06good	G06	B % wildflowers

Site	Parcel	Description	No of stops	% RYEGRASS/CLOVER	SPECIES RICHNESS/m^2	% WILDFLOWERS	% UNDESIRABLE SPECIES	% BARE GROUND	% TREES and SCRUB	Key 2a	Key 2b	Assessed as	Condition (A-C) missed targets
14	1	Nearly all good quality grassland, with *Bromopsis erecta,* but occasional less species-rich false oat-grass patches, where soil is deeper. The flat areas were not included (site large and needed to sub-sample).	20	1	15	70	<1	<1	<1	Species-rich	G06good	G06	A none
15	1	Very large field. Only looked at the northern end (sub-sample), using the OS grid line as an arbitrary boundary. Most species-rich on the bank, but still indicators in reasonable numbers elsewhere. Uniform sward height, though variable cover of herbs and white clover. Excluded two enclosed areas and one unmown area of rank grassland on bank (some with tree planting) (not sure if these were part of the arable reversion anyway). Farmer reported first pyramidal orchid this year.	20	8	12	15	<1	<1	<1	Semi-improved (G02)	G04good or G06good	G04	B % wildflowers
16	1	Large ex-arable field. Survey stand consists of two types, with a gentle gradation between them. (a) is a CG3 type (majority of the stand). On upper slopes (b) the B*romopsis erecta* is replaced by more mesotrophic grasses, particularly *Cynosarus cristatus*. (c) was excluded as is poor SSSI type, with no lowland meadow or lowland calcareous grassland indicator species, although lots of red clover, ragwort and prickly ox-tongue.	10	2	14	15	<1	<1	<1	Semi-improved (G02)	BAPmod	G06	C Indicators, % wildflowers
16	2	Large ex-arable field. Variable, but no clear boundaries so surveyed as a single stand. *Bromopsis erecta* and *Brachypodium pinnatum* present but localised. Upper slopes dominated by red clover, with more false oat-grass. Some exposed soil/limestone on lower slopes.	10	5	15	30	1	1	<1	Semi-improved (G02)	BAPmod	G04	C Indicators, %wildflowers
17	1	Upper field. Short-grazed/possibly mown throughout.	10	5	12	5	<1	<1	<1	Semi-improved (G02)	G02good	n/a	n/a
17	2 (a) and (b)	Lower field. Short mown or grazed. Better on lower slopes (b).	20	5	14	25	<1	<1	<1	Semi-improved (G02)	BAPmod	G04	C Indicators, % wildflowers

Site	Parcel	Description	No of stops	% RYEGRASS/CLOVER	SPECIES RICHNESS/m²	% WILDFLOWERS	% UNDESIRABLE SPECIES	% BARE GROUND	% TREES and SCRUB	Key 2a	Key 2b	Assessed as	Condition (A-C) missed targets
19	1(b)	Large field. Area (b) mown and herb-rich. Has clear boundary – possibly caused by difference in sowing or mowing management. Area (c) unmown margin – mosaic of tall and short areas, scattered scrub – variable time since last cut. Area (a) excluded as improved or semi-improved and herb-poor.	10	1	11	50	<1	<1	<1	Species-rich	G02good	n/a	n/a
19	1(c)	Large field. Area (b) mown and herb-rich. Has clear boundary – possibly caused by difference in sowing or mowing management. Area (c) unmown margin – mosaic of tall and short areas, scattered scrub – variable time since last cut. Area (a) excluded as improved or semi-improved and herb-poor.	10	1	12	20	1	0	2	Semi-improved (G02)	G02good	n/a	n/a
20	2+3	Very short-grazed horse pasture. Positive indicators patchy.	20	60	12	8	<1	<1	<1	Improved	BAPmod	G06	C Indicators, % wildflower
20	4+5	Herb and indicator rich. Mosaic of dense false oat-grass with tall herbs and shorter more herb-rich areas.	20	1	10	20	1	<1	0	Semi-improved (G02)	G04good or G06good	G04	B % wildflowers
21	1	The flat parts of this field were excluded from the survey and were much less rich than the sloping parts of the field. This excluded grassland is short grazed and good quality SI, and includes rare positive indicators *Galium verum* and *Centaurea nigra.* The surveyed stand was mostly species-rich lowland calcareous grassland banks. Some patches of rank false oat-grass occurred on deeper soil in the valley areas – these were also excluded from the stand. Most of the bank is a mosaic of coarse-structure grassland, finer grassland, and some large areas heavily rabbit-grazed with lots of moss, the latter being concentrated at the top of the slopes. Overall, a variable stand, but with a good species richness overall.	20	1	15	25	<1	<1	<1	Semi-improved (G02)	G04good	G04	B % wildflowers
21	2(a)	Unmown area in a field managed mainly by mowing and light grazing for nesting birds (including a cultivated area). Most of the field was mown earlier in the year and has been excluded, but the unmown area (a) surveyed.	10	1	12	10	<1	<1	<1	Semi-improved (G02)	BAPmod	G04	C Indicators, % wildflowers

Site	Parcel	Description	No of stops	% RYEGRASS/CLOVER	SPECIES RICHNESS/m^2	% WILDFLOWERS	% UNDESIRABLE SPECIES	% BARE GROUND	% TREES and SCRUB	Key 2a	Key 2b	Assessed as	Condition (A-C) missed targets
23	1 (a) to (d)	A variable field, with a mosaic of (and transitions between) MG1 grassland, rosebay willowherb, and herby banks with abundant *Clematis*. Also occasional patches of bramble. Two banks were excluded and had been recently cleared of scrub . Survey consised of 20-stops walk over rest of the area, but separated the stops into 4 areas (a) north bank, (b) rosebay willowherb area, (c) mesotrophic grassland, and (d) south bank. Condition assessment might not be appropriate for this field as not a standard grassland type. A few additional positive indicator species (*Blackstonia, Linum catharticum, Daucus carota, Sanguisorba mino*r and *Thymus* sp.) were recorded at the very edge next to the track by the ex-scrub bank, but were rare in the stand overall.	20	0	16	80	<1	0	1	Species-rich	BAPmod	G04	C Indicators
25	1	Uniform bright green field, with indicator species present throughout.	20	20	12	30	<1	<1	<1	Semi-improved (G02)	BAPmod	G06	C Indicators
25	2	Gently sloping large field. Signs of recent grazing.	20	25	10	15	1	<1	<1	Semi-improved (G02)	BAPmod	G06	C Indicators, % wildflowers
25	3	Centre of hill fort. Survey excluded the hill fort banks, as it was assumed these were never cultivated.	20	10	14	20	<1	<1	<1	Semi-improved (G02)	G06good	G06	B % wildflowers

Appendix 4: Field data summary – other parcels

Site	Parcel	Description
1	1	Large, flat ex-arable field. Ungrazed at time of survey, but previously sheep-grazed. Fairly uniform short-grazed sward, with high cover of white clover and dandelion. Positive indicator species very sparse. Wood false-brome clumps near the wood and hedges. Grasses generally not dominant, but red fescue is most abundant.
2	1	Mosaic of MG1 rough grassland, which varies from very coarse to a finer structure. Weeds are locally very abundant. Clearly unmown, at least this year, and probably in need of more management. Positive indicator species rare. Scrub abundant to locally very abundant, particularly near edges. Most species rich areas occur at the edges of the trampled paths.
5	1	Large, mostly flat field. Approaching lowland calcareous grassland / lowland meadow , probably classed as semi-improved. Recently cattle grazed. Interest is patchy, but *Lotus corniculatus* found scattered throughout.
5	3	Similar to 1, though more young scrub (hawthorn, rose and bramble) though <5%.
5	4	Probably similar to 1, though not entered.
5	5	Similar to 1, though more young scrub (hawthorn, rose and bramble) though <5%.
10	2	DAFOR as field 1, with high levels of species richness very localised. However, possibly higher frequency of G*alium verum* than in field 1.
13	2	Similar to field 1 in parts, though fewer indicators and less recently cut.
13	3	Recently cut, and grazed by cattle at time of visit. Superficial viewing suggests less herb-rich than field 1, though *Centaurea nigra* present. Lots of rye grass.
14	2	Only assessed this field very briefly. Was mown earlier in the year. Apparently not as successful as field 1, as there may have still been residual herbicides when it was sown. Recovering now.
19	2	A quick superficial assessment suggests that this field is mown, with unmown herb-poor MG1 strips.(Similar to 1a, but more clover.)
19	3	As parcel 2.
19	4	Not assessed.
19	5	As parcel 2.
19	6	Similar to parcel 2, with *Clinopodium* in the unmown MG1 margins. *Leontodon hispidus* LF over 25% of the field, but no other positive indicators recorded.
19	7	Mostly as field 6, with a cultivated patch.
20	1	Unmanaged scrub/tall-herb vegetation/rough grassland.
21	2(b)	Unmown for many years. Scrub (mainly hawthorn), average 30% cover, reaching 70% cover in parts. Positive indicator species recorded restricted to *Clinopodium*.
21	2(c)	Mown and not surveyed.
8b	2	Walk-over survey only. Similar to the most species-poor areas of field 1, but with locally occasional *Galium verum*. (Barrows excluded, as assumed never cultivated.)