



CAMPAIGN FOR THE FARMED ENVIRONMENT

ANNUAL REPORT – QUALITY ASSESSMENTS AND VERIFICATION MONITORING

MARCH 2012

Ruth Laybourn

Naomi Jones

Nigel Boatman

**Food and Environment Research Agency
Sand Hutton, York, YO41 1LZ**

CONTENTS

Executive summary.....	7
1. Introduction	14
1.1 Background.....	14
1.2 Monitoring of voluntary measures.....	14
2. Methods	16
2.1 Selection of farms.....	16
2.2 . Condition assesments	16
2.2.1 Summer condition assessment.....	20
2.2.2 Autumn condition assessment	20
2.2.3 Winter condition assessment	21
2.3 Analysis.....	22
2.3.1 Value for other species	22
2.4 Condition scoring of habitats	23
2.4.1 Scaling up.....	23
3. Results	24
3.1 Overwinter stubbles (C7a) that meet red box and green box.....	24
3.2 summer condition assessment	24
3.2.1 Common species	25
3.2.2 Species richness.....	25
3.2.3 Flower abundance	27
3.3 Autumn condition assesment results	30
3.3.1 Crop species composition and food resource in sown wild and game bird mixes.....	30
3.3.2 Weed species present in sown mixes	38
3.3.3 Farmland birds and wider biodiversity	41
3.3.4 Height of vegetation	42
3.4 Winter condition assessment results	43
3.4.1 Resource protection.....	43
3.5 Condition scores	48
3.6 Farmland Birds.....	48
3.6.1 In-field nesting	48
3.6.2 Overwinter seeds.....	49
3.6.3 Insect-rich foraging areas	50
3.7 Farmland Wildlife.....	50
3.7.1 Arable flora	51
3.7.2 Pollinators.....	51
3.8 Resource Protection.....	51

4.	Discussion.....	54
4.1	Wider Biodiversity.....	54
4.2	Farmland Birds.....	54
4.3	Resource Protection.....	56
4.4	Conclusion	56
5.	References.....	57
	Appendix 1. Species lists	59
	Appendix 2. Attributes contributing to scores and criteria for scoring.....	66
	Appendix 3 Report of spring assessments, September 2011	74
	Key messages	74
	Recommendations	75
6.	Introduction	77
6.1	Background.....	77
6.2	Monitoring of voluntary measures.....	78
6.2.1	The Field Monitoring Programme.....	78
7.	Methods	78
7.1	Selection of farms:.....	78
7.2	Assessments.....	79
8.	Results	80
8.1	Overview and Engagement with the Campaign	80
8.1.1	Participation.....	80
8.1.2	Attitudes	81
8.1.3	Awareness.....	84
8.1.4	Choice of measures ('VM-CFE' farms only)	87
8.1.5	Agri-environment agreements.....	88
8.2	Implementation of Measures	89
8.2.1	Accuracy of information recorded on Defra February 2011 postal survey	89
8.2.2	Compliance with red box requirements	91
8.2.3	Green box criteria	102
8.2.4	Areas of land under CFE measures	105
9.	Discussion.....	109

List of figures

Figure 1	Percentage top cover of bare ground and litter in summer, with standard errors.	25
Figure 2	Number of species, number of axiophytes and number of bird and butterfly larval food plants present on different measures, with standard errors.	27
Figure 3	Flower abundance (per 300 m ²) across relevant measures, with standard errors.	29
Figure 4	Seed resource and crop plant density	34
Figure 5	Seed weight per m ² for C9 areas assessed	35
Figure 6	Seed weight per m ² for C10 areas assessed	35
Figure 7	Number of seeds per m ² in C9 areas	36
Figure 8	Number of seeds per m ² in C10 areas	36
Figure 9	Weight of seed available in autumn on each measure in relation to the area of the measure	37
Figure 10	Number of seeds available in autumn on each measure in relation to the area of the measure	37
Figure 11	Decline in the number of crop plants present between the autumn and the winter visit.	38
Figure 12	Mean bare ground and litter present on measures, with standard errors	41
Figure 13	Mean percent weed cover of measure providing potential food for birds (i.e. evidence of flowering or seeding), with standard errors.	42
Figure 14	Mean height of vegetation within measure, with standard errors	42
Figure 15	Width of buffer strips (measures present as blocks are excluded), with standard errors.	43
Figure 16	Penetrometer readings from compacted and uncompacted areas (from measures where compaction was present), with standard errors.	46
Figure 17	Cover of vegetation, bare ground and litter in February/March, with standard errors.	47
Figure 18	Methods of participation for those who considered that they were participating in the CFE.	80
Figure 19	Overall awareness of different aspects of the Campaign for both groups of farmers in 2011 and 2010. *not directly comparable between years.	85
Figure 20	Sources of information for both groups of farmers.	86
Figure 21	Sources of advice	87
Figure 22	Reasons for 'VM-CFE' farmers implementing measures	87
Figure 23	Agri-environment schemes.	88
Figure 24	Probability of failure for an individual RBR with 95% confidence intervals	92
Figure 25	Skylark plot	94
Figure 26	Voluntary C10 Game strip that failed RBR	96
Figure 27	Variation in area of C9 measures failing the RBR due to area.	96
Figure 28	Two examples of pollen and nectar mix (C12a) which a) had at least four sown species and b) did not meet the RBR because only one species was sown	97
Figure 29	Distribution of farms with varying percentages of land under cropped and uncropped Campaign measures	107
Figure 30	Percent of arable area on individual farms under cropped voluntary measures	107
Figure 31	Percent of arable area on individual farms under uncropped voluntary measures..	108

List of tables

Table 1	CFE Voluntary measures with target environmental benefits.....	15
Table 2	Summary of measures revisited during the condition assessments.....	17
Table 3	Summary of condition assessments and timing for each measure (Boatman, 2010 - scoping report).....	18
Table 4	Range of summer assessments for each measure.....	20
Table 5	Soil texture groupings.....	22
Table 6	Most frequently recorded species and groupings with % frequency of sites at which they were recorded, % abundance within sites at which they occurred and % top cover across all features. Shaded species are axiophytes.....	26
Table 7	Number of axiophytes and number of bird and butterfly larval food plants present on different measures as percentage of total numbers of plant species	27
Table 8	Most abundant flower species with total abundance per 300 m ² across all features assessed	28
Table 9	Species with dead flowers only	29
Table 10	Species with the most abundant live flowers	30
Table 11	Crop species most frequently recorded under C9 and C10.....	31
Table 12	Number of seeds recorded in C9 and C10	33
Table 13	Most common weed species and associated bird species found in C9 areas	40
Table 14	Most common weed species and associated bird species found in C10 areas	40
Table 15	Number of measures assessed in relation to their position on a slope and mean slope for each measure.....	44
Table 16	Slope of the field for measures situated at the bottom of a slope	44
Table 17	Number of areas likely to benefit resource protection with respect to location	45
Table 18	Number of features on different soil types in relation to position and slope.....	45
Table 19	Numbers of measures where compaction was recorded in relation to the location of measures.....	46
Table 20	Mean ratios of scores to maximum scores at farm level for farmland birds in 2011	49
Table 21	Mean ratios of scores to maximum scores at farm level for farmland wildlife in 2011 ..	51
Table 22	Mean ratios of scores to maximum scores at farm level for resource protection in 2010/11 ..	52
Table 23	Plant species groupings (1=yes, 0=no).....	59
Table 24	Butterfly species for which presence of larval food plants was analysed.....	61
Table 25	Bird species for which presence of food plants was analysed	61
Table 26	Species recorded in summer botanical assessments	62
Table 27	Key attributes for farmland bird options to be assessed in field (normal text) or by interview (italics). Criteria highlighted in yellow result in a score of zero if not complied with ..	66
Table 28	Key attributes for farmland wildlife options to be assessed in field (normal text) or by interview (italics)	70
Table 29	Key attributes for resource protection options to be assessed in field (normal text) or by interview (italics)	72
Table 30	Summary of farms visited, individual areas assessed and those meeting RBR.....	76

Table 31	List of CFE Voluntary Measures	77
Table 32	Number of farmers that considered they were participating in the Campaign.	80
Table 33	Support for the aims and approach of the Campaign (%). Undecided not shown.	81
Table 34	Aspects of the Campaign particularly liked by 'VM-CFE' farmers.	81
Table 35	Aspects of the Campaign particularly disliked by both groups.	83
Table 36	Additional comments regarding farmers' support for the Campaign.....	84
Table 37	Percentage of farmers who were aware of different aspects of the Campaign in 2011. 85	
Table 38	Number of farms and area of measures expected from Defra February questionnaire compared to measures found on the ground.....	90
Table 39	Reasons why land similar to voluntary measures was not considered part of the Campaign by 'VM-other' farmers.....	91
Table 40	Number of farms, areas and number of features meeting Red Box Requirements (RBR) based on all available information.	93
Table 41	Reasons for RBR failure for both 'VM-other' and 'VM-CFE' farms. Numbers in parentheses represent number of individual features, failures in italics are those assessed through visit interview.	95
Table 42	Importance of RBR failures and potential for meeting RBR of other measures. Number of farms* with number of features in parentheses.....	98
Table 43	Measures undertaken specifically in response to the Campaign.....	100
Table 44	Impact on 2011 RBR criteria on compliance rates (shaded lines have had changes to criteria, percentages are shown in parentheses).....	101
Table 45	Number of farms failing to meet RBR for visit interview questions alone and all available information.	102
Table 46	Measurable green box considerations (adapted from CFE Farmer's Guide).....	103
Table 47	Average size of individual measures	106

EXECUTIVE SUMMARY

Introduction

1. The objective of the Campaign for the Farmed Environment is to maintain and exceed the environmental benefits of set-aside in terms of farmland birds, resource protection and wider biodiversity. To achieve this the Campaign partners are encouraging farmers to:
 - Enter or renew Entry Level Stewardship (ELS) agreements.
 - Include in-field or 'target' options in ELS agreements.
 - Maintain uncropped land and improve the environmental management of this land.
 - Undertake voluntary measures as part of the Campaign.
2. The objectives of this field monitoring programme are to assess farmer attitudes and awareness of the Campaign and to monitor the implementation, management and environmental benefits of the Campaign's **voluntary measures**. This report details findings from the condition assessments of habitat quality undertaken between July 2011 and March 2011. In order to provide a comprehensive overview of the second year of monitoring of the Campaign voluntary measures, **this summary also includes information from the spring 2011 visits**, which assessed farmers' attitudes to the Campaign and the management of features, including 'red box' requirements. The full report of the spring visits is included as an appendix to this report.

Methods

3. In February 2011, Defra conducted a postal survey of a sample of farmers to identify those that were undertaking voluntary management. The results of this survey were used to identify a sample of 100 farmers who reported that they were undertaking voluntary management as part of the Campaign, termed '**VM-CFE**' for the purposes of this report, and a sample that were undertaking voluntary management but not in response to the Campaign – termed '**VM-other**'. In order to include measures less commonly implemented, half the sample was selected by targeting farms where less common measures were apparently present.
4. Telephone and interview surveys revealed that there were inconsistencies in the way in which farmers interpreted and responded to the postal questionnaire, probably because, at this early stage, the Campaign had not been running for long enough for farmers to have a clear understanding of what it entailed, or to implement new measures¹. Many 'participant' farmers had included any existing uncropped land as management undertaken 'explicitly as part of the Campaign' and one third of the 'non-participant' sample had uncropped land on the farm that they had not recorded as voluntary management under the Campaign.
5. A total of 104 visits to 'VM-CFE' farmers and 56 'VM-other' telephone interviews were undertaken. However, seven of the VM-CFE farms were not considered to be undertaking voluntary measures when interviewed. Interviews explored the farmers' knowledge of and attitude to the Campaign in general terms, including their current and potential future engagement with the Campaign. VM-CFE interviews included specific questions regarding the management of any uncropped land or cropped land that corresponded to Campaign measures on the farm. Field surveys were carried out to verify the presence of these features and to assess the environmental management being undertaken.

¹ The Campaign was launched in November 2009, and the Defra survey was carried out in February 2010, however guidelines were not sent out until after the launch so farmers had had little time to implement new voluntary measures.

6. Visits were timed to maximise the value of assessments against the aims of the measures with respect to: farmland birds, wider biodiversity and resource protection. Summer visits assessed the botanical composition and flower abundance for pollinators of measures that aim to provide wider biodiversity benefits and in-crop measures designed to benefit farmland birds. Autumn visits monitored the food resources (largely for birds) provided by game and wild bird cover and by overwintered stubbles. Winter visits aimed to establish the likely benefits for resource protection, through assessment of attributes such as location and size of feature, vegetation cover and soil texture. In addition, a subsample of farms visited in autumn was also re-surveyed in February, to estimate the provision of bird food at this critical time of year. Habitat condition data were analysed at the feature level.
7. A range of attributes were selected based on the condition assessments for each voluntary measure, linked to the appropriate CFE theme(s) to which it primarily contributes. These were scored against benchmarks for specific criteria on a pass/fail basis for each one. These criteria applied to attributes assessed either in the field, or on the basis of information provided by the farmer or land manager at interview. A 'success' rating for each example of each voluntary measure was derived from the score for each example of the measure, expressed as a proportion of the total possible score to correct for different numbers of attributes applying to different measures. These were then scaled up to farm level

Results – Attitudes to the Campaign (from interviews during spring visits)

8. Most of the VM-CFE sample considered themselves to be contributing to the Campaign (up from 70% in 2010 to 96% in 2011), but only 59% of VM-other farmers considered that they were participating. Sixty-six percent of VM-CFE farmers and 25% of VM-other farmers were undertaking voluntary measures. Also, most of the VM-other and more than half of the VM-CFE farmers were participating through agri-environment agreements. Sixty-eight percent of VM-other farmers were not intending to implement voluntary measures, because they did not want to be part of a formal scheme, thought their Environmental Stewardship agreement was sufficient, had not considered the CFE or did not know enough about it.
9. Farmers were largely supportive of the aims of the Campaign (92% of VM-CFE; 70% VM-other) and approach (74% of VM-CFE; 84% of VM-other), though these figures represented a slight reduction on the previous year.
10. Positive aspects of the Campaign for included the fact that it was voluntary, flexible, and led to environmental benefits. However, some farmers were concerned that being a voluntary scheme would allow some farmers to contribute nothing, some thought messages unclear, some thought it should not be required in addition to agri-environment schemes and some thought additional features should be included (e.g. woodlands).
11. Awareness of different aspects of the Campaign was consistently higher for 'VM-CFE' than 'VM-other' farmers. Awareness of the three themes and methods of implementation was generally high. Two thirds of VM-CFE, but only a quarter of VM-other farmers, were aware that there were national targets. There was a small increase in awareness in 2011 of implementation, targets, sources of advice and regional targeting amongst 'VM-CFE' farmers
12. The voluntary measures booklet and the farming press and Campaign partner organisations were the most commonly cited sources of information.
13. A total of 84% of the 'VM-CFE' and 64% of the 'VM-other' farms surveyed had an existing agri-environment scheme. A number of farmers (both 'VM-CFE' and 'VM-other') considered that, because they had an ELS points total in excess of their target, that the additional management was voluntary and should therefore contribute to the Campaign targets.

14. Reverted arable areas (C3a), grass buffers along watercourses (C1), overwintered stubbles (C7a), pollen and nectar mix (C12a), wild bird seed mixture (C9) and game strips (C10) were the most common Campaign voluntary measures implemented on farms, similar to the previous year.

Results - Management

15. There was considerable inconsistency between measures recorded in the Defra survey and those encountered on the ground. Only 32 of those visited had completed the Defra questionnaire correctly. Overall, 30% of farms did not have measures expected when visited, but 11% had measures that were not expected from the Defra survey.
16. Most VM-CFE farmers who did not record voluntarily managed land under the campaign either completed the Defra questionnaire incorrectly, or recognised that the land did not meet the red box requirements. VM-other farmers did not record such land because there had been no change in management; uncropped areas existed already or cropped areas were part of the usual farm rotation, the land did not meet the red box requirements, or they did not want their land to be part of a scheme.
17. Only 49% of features assessed met the 'red box' requirements, only slightly higher than 2010 (46%)². The proportion of the total area assessed that met the RBR was 43% (unweighted) or 41% (weighted by amount per measure). However, when changes to the guidelines were taken into account, 55% of features and 47% of the area complied with the RBRs. Requirements of C3a were least likely to be failed, whereas those for in-field plots (C4 and C5) were most likely to be failed.
18. Out of those interviewed, 38 farms had implemented voluntary management as a result of the Campaign in 2011, compared to only eight in 2010. Pollen and nectar mix (C12a) wild bird seed mix (C9) and skylark plots (C4) were most commonly implemented specifically in response to the Campaign.
19. For those farms that had uncropped measures, these measures covered on average 4.95 % of the arable farm, similar to 4.73% in 2010. For the farms that had cropped measures, an average of 15.41% of the arable area was under one or more of these measures.
20. Information on management of overwinter stubbles was collected in autumn in relation to the specific areas in stubble over the 2011/12 winter. The main reason for failure of C7a in meeting the red box requirements was the application pre-harvest desiccants or post harvest herbicides. Only one of the 12 farms visited with stubbles would cultivate stubbles before 15 February (the earliest data suggested in the guidelines). Two farms (representing 8 fields) failed because of the application of manure or fertilizer.

Results - Condition assessments of habitat quality

21. Botanical assessments carried out during the summer indicated that most features (sample largely C1 and C3a) were dominated by perennial (usually) grass species typical of uncropped areas on fertile farmland; relatively few species were indicators of habitat quality (axiophytes).
22. Total species richness was similar for all measures except skylark plots (C4). Only a small proportion (5-16%) of the species present were axiophytes, and these were usually recorded on few measures and at low abundance. Axiophytes were most common on C12a (pollen nectar mixtures) and C3a (reverted arable areas). Around 50% of plant species were potential bird food plants except on C4 (27%) and C5 (34%).

² These are management specifications set out in the CFE farmer guidelines that must be followed if the voluntary measure is to count towards the Campaign target related to the area of voluntary measures. There are also 'green box' guidelines, which are advisory only and provide recommendations to further enhance the environmental value of the measure if desired by the farmer or land manager.

Butterfly food plants ranged from 0 (C5 and 3.6(C4) to between 18 and 31% on other measures.

23. Cover of bare ground or litter was low for measures C1 and C3a which had usually been established for some years, but higher on cropped measures.
24. Live flower abundance was highest on C12a at over 27,000 flowers per 300 m²). Mean numbers of live flowers on other measures assessed were 7642 (C3a), 2088 (C1) and 927 (C3b). Only 10 of 103 features managed as one of these four measures had no live flowers present.
25. Autumn assessments of sown wild and game bird mixtures indicated that there was a large variation in the amount of food resource available in terms of seed mass or seed number, but seed resources were considerably higher than in 2010. Average seed numbers per square metre were over 30,000 for C9 and 44,000 for C10. However, quite a few examples, especially of C10, had little or no seed present. Very few features retained any seed through until late winter.
26. Some weed species were a potential food source on both sown mixtures and stubbles if seeds are produced. Weed cover of relevant species that were seeding or were likely to produce seed was between 3 and 8% on the different measures in autumn. However, seeding plants of these species represented less than 3% cover when reassessed in late winter.
27. Assessments of the value of the range of measures intended to benefit resource protection (C1, C2, C3a and C3b) indicated that half were adjacent to a water body, and overall, 64% were located in potentially beneficial situations (nest to a water body, intercepting a slope, or intercepting a natural drainage channel).
28. A number of features managed as these measures did not meet the width criteria: only around 60% of C1, C3a and C3b met the requirements and 28% of C2 strips.
29. Forty percent of features were situated at the bottom of a slope, where the average incline was 4.0°. Evidence of vehicle use was noted on 41% of features assessed for resource protection benefits, ranging from light vehicle use to extensive compaction. Greatest levels of compaction were found on C3a areas and least on C3b areas.
30. Mean percentage vegetation cover was between 60 and 70% on C1, C2 and C3a, but less than 50% on C3b.

Results – Condition scores

31. Condition scores at farm level weighted per unit area relative to maximum possible scores are presented for both 2010 and 2011, as they were not reported in 2010. Measures were scored in relation to the relevant environmental theme(s), as identified in the CFE guide.
32. In terms of in-field nesting habitat for farmland birds, individual skylark plots (C4) scored highly but density was generally too low and trees or woodland were present in the boundary in more than half the fields assessed. Fallow plots (C5) all scored zero because they were too small or too close to trees or woodland (in fact, most were narrow boundary strips).
33. Overwintered stubble (C7a) scores for bird seed food provision were 55% in 2011, up from 30% in 2010. A lower proportion were treated with pre-harvest desiccant or post-harvest herbicide in 2011, and also a higher proportion had a range of stubble heights, making them suitable for foraging by a range of bird species. Evidence of seed production by weeds was noted in 63% of stubbles in 2010 and 54% in 2011. Only a few examples of stubble followed by fallow (C6) were assessed, but these scored well in both years (78% of maximum possible score).
34. Wild bird seed mixtures (C9) and game strips (C10) scored around 50-6-% of the maximum possible scores. Many had low cover of sown crops and low proportions of

sown crops producing seed. However, as noted above, they were very variable, with some providing useful levels of seed resources and some providing little or nothing.

35. Scores for reverted arable areas (C3a) were significantly higher, in terms of potential to benefit plants and invertebrates, in 2011 than 2010 (p from 62 to 80%). In 2011, sward structure was better on average in terms of the amount of tussocks present, and more areas had uncut margins. Scores for scrub management were only available for 2011; they were also high (75%).
36. Uncropped cultivated margins (C8) is the key measure for conservation of arable flora, however only one out of the three examples assessed had any rare arable plants present.
37. Pollen and nectar mixtures (C12a) scored similarly in both years (65-67%). However, percentage cover of sown crops was generally lower than desirable. Flower abundance was higher in 2011 than 2010, and a higher proportion had appropriate cutting management.
38. Scores for measures relevant to resource protection (C1, C2 and C3a) were higher in 2011 compared to 2010, significantly so for C1 and C3a. In 2010, only around half of C1 buffer strips were located on high risk soil types, but in 2011 most were located on high risk soil types. However, there were still areas where management could have been improved. For C1 these included removal of compaction, removal of cuttings, cutting management of the 3m next to the watercourse, and strip width.
39. There were also a number of areas where management of C2 (grass areas to prevent erosion and runoff) could have been improved. These included vegetation cover, location and width.
40. C3a (reverted arable areas) is a multi-functional measure and resource protection is not necessarily the primary consideration in location and management. Bearing this in mind, the significant improvement observed between 2010 and 2011 in scores for attributes related to resource protection is encouraging. Better vegetation cover and less evidence of compaction and greater incidence of compaction removal were among the main differences between years.

Discussion – Farmer engagement

41. Support for the Campaign was high, though lower than in 2010. This contrasts with results from the Defra survey, which indicated an increase in 2011 albeit from a lower base. However, the Fera survey only covered a relatively small sample of farmers who had voluntary measures and indicated a willingness to take part, and so was not necessarily representative of the whole population.
42. Discrepancies between the Defra survey and the actual situation on the ground suggest that the postal questionnaire results were not totally reliable, and that many farmers still do not understand what the voluntary measures are. Disappointingly also, the proportion of farmers meeting the red box requirements had not changed appreciably from the previous year. However, more farmers had implemented measures specifically in response to the Campaign than in 2010.
43. Telephone surveys indicated that a significant amount of management recorded as not contributing to the Campaign probably meets red box requirements. There is a need to obtain further information on this aspect. The reason for recording land as being outside the Campaign was often that the survey respondent was not sure if it fulfilled the red box requirements, but as many areas considered to be inside the Campaign also did not comply, it is not clear how different the condition of areas within and outside the CFE is. Field assessment of management of features considered to be outside the Campaign would clarify the extent to which such management was similar to that inside the Campaign.

Discussion – Habitat quality

44. A wider range of measures was available for assessment in 2011 than in 2010, but take-up of some measures (C7b, C12b, C13, C14 and C15) was still too low for an adequate sample to be drawn. Many of the measures assessed were not created or managed specifically as CFE voluntary measures and the results need to be considered in this context. Results indicated improvements in quality of several measures in 2011 compared to 2010.
45. As in 2010, botanical composition of measures on long-term uncropped land (e.g. C1, C3a, C3b) was similar to set-aside, and provided similar resources in terms of food plants for birds and butterflies. C3a sward structure was closer to that recommended in 2011 than 2010, indicating a greater degree of management. There is scope for clarification of the guidelines, especially in relation to cutting management where there are apparently conflicting recommendations in the red and green boxes.
46. Flower density in pollen and nectar mixtures (C12a) was higher than in 2010, indicating a high level of resource availability for pollinating insects compared to figures recorded in the literature. There was still scope to improve over of sown species however.
47. Provision of nesting habitat for ground-nesting birds was disappointing. Skylark patches (C4) were generally of adequate quality but density was generally far too low and in some cases they were implemented in fields with trees or woodland in the boundaries. Areas identified by farmers as fallow plots (C5) were almost all narrow boundary strips and often adjacent to trees or woodland. None were considered suitable habitat for the target species. There is clearly a need for reinforcement of guidelines for these measures through the provision of additional advice. It would also be helpful to alter the guideline for C5 to explicitly state that this measure should not be placed at field edges.
48. Measures designed to provide winter food for seed-eating birds were variable. Stubbles were generally of higher quality than in 2010. Fewer C7a stubbles had been treated with pre-harvest desiccant or post-harvest herbicide than in 2010, though this had still occurred on several farms, which is likely to severely reduce their value as foraging areas for birds. Interestingly, in 2011 (and in contrast to 2010), the majority of stubbles were variable in height with a substantial proportion both above and below 10cm high. Such stubbles are likely to provide suitable foraging habitat for a wide range of bird species, providing sufficient weeds are present.
49. Wild bird seed mixtures (C9) and game strips (C10) were very variable, ranging from areas providing little or no seed to areas providing a substantial food resource. However, by late winter all areas assessed had little seed remaining on the sown plants, though there may still have been shed seed available on the soil surface and weeds growing within the crops may also have provided additional resources. A number of examples, particularly of C10, were sown with maize and strengthening of messaging in this area would be beneficial.
50. Scores for measures with particular relevance for resource protection were higher than in 2011, but there was still room for further improvement. For example, only 71% of C1 areas (grass buffers alongside temporary and permanent watercourses) were in fact next to a watercourse, and only 61% of C2 areas were in locations that were likely to reduce erosion or limit pollution of watercourses. Farmers should be familiar with the concept of buffer strips, but C2 is a more recently introduced type of approach with more complex underlying concepts, and further advice may help to encourage appropriate location of this option.

In conclusion, there are encouraging signs of improvements in a number of areas in 2011 compared to 2010. However, there is still scope for additional improvements if the intended environmental benefits of the Campaign are to be fully realised, and it is to be hoped that the monitoring programme in 2012 will reveal further progress.

1. INTRODUCTION

1.1 BACKGROUND

The Campaign for the Farmed Environment (CFE) is an industry-led scheme to offset the environmental impacts of the abolition of set-aside. It is hoped that by encouraging uptake of Environmental Stewardship and relevant options within this scheme, and also the voluntary implementation of a range of measures, the environmental benefits of set aside will be recaptured and even exceeded. The Campaign has three themes; farmland birds, other biodiversity and resource protection. National targets for the CFE have been set, with the provision that if these are not met by the end of the three-year life of the Campaign, the voluntary approach could be replaced with a regulatory scheme. Key targets are:

- To double the uptake of the agri–environment Entry Level Scheme 'in-field' options
- To increase uncropped land by 20,000 hectares from January 2008 levels (with improved environmental management on 60,000 hectares)
- To introduce voluntary measures on other land covering at least 30,000 hectares and up to 50,000 hectares.

There are 15 voluntary measures (some with variants) that farmers are encouraged to implement (Table 1), with guidance on how they should be managed. Guidance is split into 'essential' management requirements ('red box') and additional considerations ('green box'). Uptake of voluntary measures is monitored through an annual postal survey carried out by Defra Agri-Environment Statistics Team in February. Field verification and assessment of quality of habitat is undertaken on a sample of farms that responded to the Defra questionnaire.

The objectives of the field monitoring programme include assessing farmer attitudes and awareness, and future intentions, verifying the implementation of voluntary measures, assessing environmental quality of features managed under voluntary measures, and estimating levels of environmental benefits accruing from these measures.

Results from farmer interviews and verification monitoring were reported in September with analysis against red box requirements (this report is reproduced for reference in Appendix 2). The present report documents the findings of the condition field assessments undertaken between July 2011 and March 2012.

1.2 MONITORING OF VOLUNTARY MEASURES

The objectives of the field monitoring programme are as follows:

- To assess farmer attitudes and awareness of the Campaign, including monitoring farmer intentions for subsequent years to assess future potential of the Campaign (Appendix 2);
- To verify that farmers have put in place the measures they claim they have (Appendix 2),
- As far as possible, to assess the quality of the environmental management and resulting habitats and features, for measures implemented as part of the Campaign and also those that were already present in the baseline,
- To estimate the extent of delivery of environmental benefits from measures, both those already put in place and those intended, based on literature review and expert opinion.

This report presents the results of the July 2011 to March 2012 monitoring, which assessed the final two objectives. In relation to the third objective, the main aim was to assess management of the measures and to establish whether this met the 'red box' requirements and additional 'green box' management. Preliminary information on quality of the habitat or feature was obtained during the initial visit in spring 2011. This information was used to assess features against red box requirements (Appendix 2). Red box requirements are reviewed in this report for stubble measures, to take into account additional information collected in autumn assessments. All

measures were assessed in relation to the specific environmental issues that they were designed to benefit (Table 3) (for further information, see Boatman, 2010).

Table 1 CFE Voluntary measures with target environmental benefits

Code	Measure	Target benefits		
		Farmland birds	Wider biodiversity	Resource protection
C1	Grass buffers alongside temporary and permanent watercourses		√	√
C2	Grass areas to prevent erosion and run-off			√
C3a	Reverted arable areas		√	√
C3b	Optional scrub management		√	√
C4	Skylark plots	√		
C5	Fallow plots for ground-nesting birds on arable land	√	√	
C6	Overwinter stubble followed by spring/summer fallow	√	√	
C7a	Overwintered stubble	√	√	
C7b	Optional measure for vulnerable soil – cover crop/green manure		√	√
C8	Uncropped cultivated margins	√	√	
C9	Wild bird seed mixture – arable/grassland areas	√		
C10	Game strips	√		
C11	GWCT unharvested cereal headlands	√	√	
C12a	Pollen & nectar mixtures for arable or grassland areas	√	√	
C12b	Optional flower mix for use with horticultural crops	√	√	
C13	Sown wildflower headlands	√	√	√
C14	Selective use of spring herbicides	√	√	
C15	Enhanced management of short rotation coppice		√	

2. METHODS

2.1 SELECTION OF FARMS

Farms were selected for monitoring from among those responding to the postal questionnaire sent out by Defra in February 2011, who indicated that they would take part in further research. Throughout this report the term '**VM-CFE**' is used to describe those that indicated they were implementing voluntary measures as part of the Campaign. '**VM-other**' refers to those respondents who indicated they had uncropped land similar to voluntary measures but did not consider it to be part of the Campaign. 'VM-other' farmers were selected on a different basis from 2010, when all those that indicated they were not undertaking voluntary measures as part of the Campaign were included in the sample and referred to as Non-participants. As a consequence, data for 'VM-others' in 2011 is not directly comparable with data for 'Non-participants' in 2010. Some data for 2010 are included in this report for reference purpose only.

The reason for this difference is in the 2011 Defra survey, farmers were asked about management practices of any areas similar to voluntary measures that they did not, for whatever reason, consider to be part of the Campaign. The change in emphasis resulted from a particular policy interest in understanding what this management involved and whether this land actually met red box requirements. In the 2010 survey, farmers were only asked about management of land in the Campaign.

The sample of 'VM-CFE' farms was selected from the 676 that responded to Defra's postal questionnaire, who were implementing voluntary measures as part of the Campaign and indicated that they would be willing to be contacted about further survey work. Around a third of respondents declined to be contacted further. A sample of 100 farms was selected, of which 50% were selected at random and 50% targeted to include less common measures. The same number of reserve farms was selected. Targeted farms were selected at random from those entering each of the less common, however measures C7b C12b, C13, C14 and C15 were excluded because returns from the postal survey indicated that only a very small proportion of farms were implementing these measures, therefore sample size, even of a targeted sample, would be insufficient to make robust assessments of these measures. Measures with intermediate levels of uptake (C11, C8, C5, C6, C12a, C4, C3b, C2) were included in the sample until a target of twelve farms was reached for each, although difficulties in contacting farmers and differences between measures implemented on farms and those declared in the Defra postal questionnaire meant that this minimum number of 12 farms was not always achieved.

A total of 104 farms were visited between April and June, however seven of these farms were not considered to be undertaking voluntary measures when interviewed. This discrepancy was due to measures having recently entered or already been in ES or because measures were on grassland, therefore not relevant to the Campaign. On these farms, measures were not assessed in the field, however the farmer was interviewed about their attitudes to the Campaign and these responses have been included in the analysis.

The number of measures re-visited for the condition assessments are listed in Table 2

2.2 . CONDITION ASSESMENTS

Condition assessments were carried out at the optimum time to assess the intended benefits of the different measures, hence most measures were monitored twice because they are designed to have multiple benefits. Summer assessments were undertaken on measures that aim to provide benefits largely to wider biodiversity, but also to farmland birds. Autumn visits were targeted at measures providing benefits to birds in terms of seed food availability and winter assessments concentrated on benefits to resource protection, but also re-assessed provision of seed food for birds on measures assessed in the autumn, because food availability is important at this time of year. Details of assessments and timings are summarised in Table 3

Table 2 Summary of measures revisited during the condition assessments

Summer	C1	C3a	C3b	C4	C5	C8	C12a	Total
Farms	13	19	11	7	1	2	14	
Measures	24	37	19	14	2	3	23	
Autumn	C6	C7a	C9	C10				
Farms	5	12	12	12				
Measures	6	35	17	33				
Winter	C1	C2	C3a	C3b	C6	C7a	C9	C10
Farms	12	10	10	7	2	14	14	10
Measures	28	21	19	14	3	29	18	27

Table 3 Summary of condition assessments and timing for each measure (Boatman, 2010 - scoping report)³

Code	Short description	Farmland birds		Wider biodiversity		Resource protection	
		Attribute	Timing	Attribute	Timing	Attribute	Timing
C1	Grass buffers along watercourses			Height of vegetation Botanical composition Flower abundance	Summer	Ground cover Location (slope etc.) Evidence of runoff interception Soil texture, compaction	Late Winter
C2	Grass areas to prevent erosion					As for C1	Late Winter
C3a	Reverted arable areas			Height of vegetation (& variability) Botanical composition Flower density	Summer	As for C1	Late Winter
C3b	Optional scrub management			% grass and scrub Plant & bare ground cover Botanical composition (inc. scrub) Flower density in grass	Summer	As for C1	Late Winter
C4	Skylark plots	Botanical composition Height of vegetation	Summer				
C5	Fallow plots for birds	Botanical composition Height of vegetation	Summer	As for birds	Summer		
C6	Stubble + fallow	Botanical composition Plant & bare ground cover Height of vegetation Growth stage (evidence of flowering/seed production)	Late autumn/ early winter (+ late winter)*	Botanical composition Growth stage (evidence of flowering/seed production)	Late autumn/ early winter		
C7a	Stubble	As for C6	Late autumn/ early winter (+ late winter)*	As for C6	Late autumn/ early winter		
C7b	Cover crop/ green manure					Location (slope etc.) Cover of crop and non-crop vegetation Soil texture	Late winter
C8	Uncropped	Botanical composition	Summer	As for birds	Summer		

³ NB not all measures were actually assessed as the available sample for some was too small (see section 2.1)

Code	Short description	Farmland birds		Wider biodiversity		Resource protection	
		Attribute	Timing	Attribute	Timing	Attribute	Timing
	cultivated margins	Height of vegetation					
		Crop & weed species					
		Plant & bare ground cover					
C9	Wild bird seed mix	Height of vegetation	Late autumn (+ late winter if possible)				
		Seed production/plant					
		Plant density					
		Game-bird feeding					
C10	Game strips	As for C9	Late autumn				
		Botanical composition					
		Crop, weed & bare ground cover	Summer				
C11	GWCT Unharvested cereal headlands	Height of vegetation		As for birds	As for birds		
		Seed production/plant	Late autumn				
		Plant density					
C12a	Pollen/nectar mixes	Height of vegetation	Summer	Botanical composition Height Flower abundance	Summer		
C12b	Flower mix for horticulture	As for C12a	Summer	As for C12a	Summer		
C13	Sown wildflower headlands	Height of vegetation	Summer	Botanical composition Flower abundance	Summer	Ground cover Location (slope etc.) Evidence of runoff interception Soil texture, compaction	Winter
C14	Selective herbicide	Botanical composition	Summer	Botanical composition	Summer		
C15	Short rotation coppice			Margin strips only: Plant & bare ground cover Height of vegetation Botanical composition Flower abundance	Summer		

2.2.1 Summer condition assessment

Summer condition assessments were undertaken on a subsample of 38 of the farms from the original set of the 97 visited 'VM-CFE' farms. The purpose of the visits was to establish the condition of those measures that are intended to have benefits to birds and wider biodiversity during the summer. Attributes assessed were chosen in order to provide evidence of the likely value of the measures on the ground for the targeted taxa. These measures are listed below with relevant assessments (Table 4).

Table 4 Range of summer assessments for each measure

Measure	Height	Botanical composition	Flower abundance	% grass & scrub
C1	Yes	Yes	Yes	
C3a	Yes	Yes	Yes	
C3b*	Yes (incl. Scrub)	Yes (incl. Scrub)	Yes (excl. scrub)	Yes
C4	Yes	Yes		
C5	Yes	Yes		
C8	Yes	Yes		
C12a	Yes	Yes	Yes	

*Single overall assessment of proportion of area that includes scrub. Flower abundance in the area without scrub (assuming this exists). Height and botanical composition across the whole area.

Botanical composition was assessed for all measures listed in Table 4. This was done through the sampling of 20 small quadrats (0.1 m²) distributed randomly throughout the area under the measure. The information recorded in each quadrat was:

- Height of the vegetation in the centre of the quadrat (cm)
- Drop disc height
- Top cover – pin hit was recorded
- All species present in the quadrat, plus bare ground, bryophyte and litter were recorded (presence or absence)

Flower/inflorescence abundance was recorded in 40 large quadrats (1 m²) on 94 features. The number of flowers of each species that were potentially valuable as a pollen and nectar source was recorded. Because assessments were undertaken over a period of months, abundance of dead flowers was also recorded to provide a more comparable estimate of the total potential resource available. A flower unit was identified (*cf. Carvell et al., 2004*) as: an umbel (e.g. *Heracleum sphondylium*), head (e.g. *Trifolium pratense*), spike (e.g. *Lotus corniculatus*) or capitulum (e.g. *Tripleurospermum inodorum*).

2.2.2 Autumn condition assessment

Autumn assessments were carried out on a subsample of 27 farms with measures **C6, C7a, C9 & C10**. Most stubbles were not present during the spring 2011 visits and in many cases the landowner was uncertain at this time where the stubble would be in autumn/winter 2011/2012, therefore these visits could only collect retrospective information on stubbles present in the previous autumn/winter. The management of the stubbles present during the 2011/2012 cropping

season was therefore assessed in the autumn. Information collected during the autumn visit from the farmer/landowner for the C6 & C7a measures included:

- Area of C7a & C6
- Number of fields
- Details of any pre-harvest desiccants and post-harvest herbicides
- Details of any compaction removal
- Any fertilisers, manure, lime applied
- Information on grazing or cutting of the stubble
- Intended cultivation date, and any autumn cultivation carried out

For the field survey of the C6 & C7a areas, 20 quadrats of 0.25 m² were assessed. Within each quadrat the percentage cover of bare ground, litter, volunteer crop and individual weed species was recorded. The growth stage of the weed species was also recorded to one of the following categories: Vegetative, Flower buds present, Flowering, Seeds/fruit present, Seeds dehiscent, Dead. The height of the vegetation in the centre of the quadrat was recorded along with drop disc height.

Wild bird seed mix (C9) and game strips (C10) were assessed in the autumn sample to evaluate the resource that these measures were providing for farmland birds, from both sown and weed species. Percent cover of bare ground, bryophyte, litter, individual crop species and individual weed species was recorded in 10 quadrats 0.25 m², which were randomly located across the area of the measure. The growth stages of both the weed and crop species were recorded, using the same categories as for the stubble. The height of the vegetation in the centre of the quadrat was recorded along with drop disc height.

A second set of ten quadrats (1 m²) were sampled to evaluate the seed production of the sown crop species. The number of plants of each crop species was recorded and a randomly selected plant was sampled for each crop species in the quadrat. This would result in a maximum of ten seed heads per crop species, if the crop occurred in all ten quadrats within that given measure. In the laboratory, seeds were separated from these plants and counted to evaluate the number of seeds of each crop present within the area of the relevant measure.

2.2.3 Winter condition assessment

Winter condition assessments were carried out between January and February 2012 on a subset of 30 farms selected from the original spring sample. Measures were assessed for their contribution to resource protection and benefits to farmland birds. The measures assessed for their resource protection attributes were; **C1, C2, C3a, C3b**. For each of these measures visited in the winter sample the following information was recorded;

- Adjacent feature;
- Position on slope;
- Angle of slope;
- Likelihood of benefits to resource protection in terms of location;
- Evidence of compaction including penetrometer readings;
- Soil type- soil sample taken using 'cork borer', diameter 3 cm, depth 5 cm;
- Ground cover (vegetation, litter & bare ground) in 10 quadrats of 0.25 m²;
- Evidence of run off or erosion.

Soil was hand textured (RPA, 2010) and textural classes were grouped into: light, medium and heavy (Table 5).

Table 5 Soil texture groupings

Group	Textural class
Sandy and light silty soils	Sand
	Loamy sand
	Sandy loam
	Silt loam
Medium soils	Sandy clay loam
	Silty clay loam
	Clay loam
Heavy soils	Sandy clay
	Silty clay
	Clay

Food provision for farmland birds was assessed on measures **C6, C7a, C7b, C9 and C10**. Assessments made in the autumn were repeated to provide an assessment of the resources remaining at this time.

2.3 ANALYSIS

Data for all assessments were summarised for each measure and analysed at the feature level, although different numbers of each measure were assessed on each farm.

Botanical composition data from the summer assessments were used to calculate species richness, or species richness as a proportion of the total number of species present, for various plant groupings in order to assess the quality of measures in terms of vegetation itself and as value for wider biodiversity. These groupings were: all species, axiophytes (listed for at least one English county), species with the potential to provide food for birds and butterfly larval food plants (APPENDIX 1). Axiophytes are 'worthy plants'⁴; they represent about 40% of species and are considered interesting, although they are not rare. They can be used as indicator species to assess the value of sites. Species were classed as axiophytes (Appendix 1, APPENDIX 1. SPECIES LISTS

Table 23) if they appeared in any of the 21 county lists that have currently been compiled for the British Isles.

2.3.1 Value for other species

In order to estimate the importance of voluntary measures for butterflies, a list of 20 species of butterflies, chosen because of their broad distributions was identified (Smart *et al.*, 2000). The number of butterfly species with the potential to utilise the flora within Campaign features was determined through a search of online databases for food plants, both primary and secondary, using the Biological Records Centre Database of Insects and their Food Plants, and the Postcode Plant database of Natural History Museum together with information on the Butterfly Conservation website. The number of food plant species valuable for butterflies present during summer assessments was calculated as a proportion of the total number of species present for each area under voluntary management. The butterfly species included in the analysis and their food plants are listed in Appendix 1 (Table 24).

A list of 14 species of birds was used to determine the presence of their food plants within the areas under voluntary management. The list was based on the species used by Holland *et al.* (2006), but excluded released gamebirds, non-resident summer visitors, those with restricted ranges and Corvidae. The food plants for each of the chosen species present during summer assessments were determined using Wilson *et al.* (1996) and Holland *et al.* (2006) (Appendix 1,

⁴ (<http://www.bsbi.org.uk/axiophytes.html>)

Table 24). The number of plant species with value for birds was calculated as a proportion of the total number of species present within each voluntary feature.

Autumn crop plant counts and seed samples were combined to provide estimates of seed number and mass of species of value for birds.

2.4 CONDITION SCORING OF HABITATS

These were first presented in Boatman *et al.* (2011). They have been revised to include additional data and also to take of experience with the initial scores. The methodology is described in full by Boatman (2011). A summary is presented here, along with variations from the earlier report.

A range of attributes were selected based on the condition assessments for each voluntary measure, linked to the appropriate CFE theme(s) to which it primarily contributes. These attributes and the scoring criteria are listed in APPENDIX 2, APPENDIX 2. ATTRIBUTES CONTRIBUTING TO SCORES AND CRITERIA FOR SCORING

If criterion achieved, score = 1, otherwise score = 0). Criteria highlighted in yellow result in a score of zero if not complied with.

Table 27 - Table 29. These criteria apply to attributes assessed either in the field, or on the basis of information provided by the farmer or land manager at interview. Some of the criteria in the APPENDIX 2 tables were modified slightly from those presented in Boatman (2011) so that they could be readily calculated from the assessments carried out. Further modifications have also been made from the criteria applied in Boatman *et al.* (2011), where it was felt that the threshold levels for certain criteria should be modified, or additional criteria inserted to provide a better reflection of the quality of the habitat or feature being assessed. The changes were discussed with representatives of the Evidence and Monitoring Group in a teleconference on 29 March 2012, in conjunction with some additional changes to be implemented for analysis of data arising from 2012 field work, which required changes to field protocols and so are not applicable to 2010 and 2011 data. Data collected in 2012 and 2011 will also be collected in 2012 so that it will still be possible to compare all three years using the scoring system presented here. The 2012 data will also be scored using the slightly modified version of the scoring system.

For each attribute, the measure is given a score of 1 (complies) or 0 (does not comply), according to whether or not it complies with the states or levels set for each attribute related to location or condition. A 'success' rating for each example of each voluntary measure is derived from the score for each example of the measure, expressed as a proportion of the total possible score to correct for different numbers of attributes applying to different measures.

2.4.1 Scaling up

Scaling up to farm level is achieved by weighting the score for each example of a given measure assessed according to its area, as a proportion of the total area of that measure on the farm, i.e.:

Where s_i = score for example of measure,

a_i = area of example of measure,

a_t = total area of measure assessed

n = number of plots assessed

3. RESULTS

Results are reported in a similar format to the previous year, for ease of comparison, and also in terms of condition scores, which give a more quantitative indication of the quality of the habitats and features managed under the various measures and the potential environmental benefits likely to accrue.

3.1 OVERWINTER STUBBLES (C7A) THAT MEET RED BOX AND GREEN BOX.

In the September report (appendix 2) overwinter stubbles (C7a) were assessed as fully as they could be through farmer interviews. However the information collected was retrospective and due to the timing of the interviews the management applied to the previous overwinter stubble was not necessarily the same as that of the upcoming overwinter stubbles.

To account for this, the overwinter stubble were re-assessed from data collected in the autumn and winter visits. Farmers were reinterviewed as to the management they would apply to the overwinter stubbles. A total of 35 fields in C7a were visited on 12 separate farms during the autumn visit. Of the 12 farms visited 5 met the red box requirements (these 5 had 10 fields under C7a). This represents an increase in those meeting the red box requirements compared to 2010 when only 4 out of 13 farms met the red box criteria.

Consistent with the results of the spring interviews (see Sept report) the main reason for failure of C7a in meeting the red box requirements was the application pre-harvest desiccants or post harvest herbicides. This was the case on 6 farms with 20 fields under C7a. On two of these farms however, the farmer did say that he would only use the herbicide to spot treat for weeds, and one would only use on the headlands so the majority of the field should be herbicide free and there for meet the red box criteria.

From the information obtained at the autumn and winter visit, only one of the 12 farms (with 5 fields under C7a) selected for re-visits would cultivate their C7a before the 15th February. Two farms (representing 8 fields) failed because of the application of manure or fertilizer.

None of the overwinter stubbles were located on fields that had severe weed infestations, and one farmer intended to cultivate the land by a light disking in the autumn that could potentially have provided additional environmental benefits.

3.2 SUMMER CONDITION ASSESSMENT

A total of 180 plant species (or groups of species, where identification to species could not be achieved) were recorded on the 122 areas surveyed under C1, C3a, C3b, C4, C5, C8 and C12a. However, some plants that could not be identified to species were probably species already recorded. Of all species recorded, 58 were axiophytes, 48 were potential bird food and 24 were potential food for butterfly larvae. However, most species were uncommon, with one third of species recorded on only one (31 species) or two (25 species) features.

A measure of percent top cover was derived from the pin hit data. Mean cover of bare ground and litter (representing gaps in the sward) was low (<5%) for measures that had generally been established for a number of years (C1, C3a, C3b) and on C12a (Figure 1). For those measures that would have been cultivated this year, (C4, C5, C8) bare ground was recorded on a much greater proportion of pin hits. Litter cover was highest on C4.

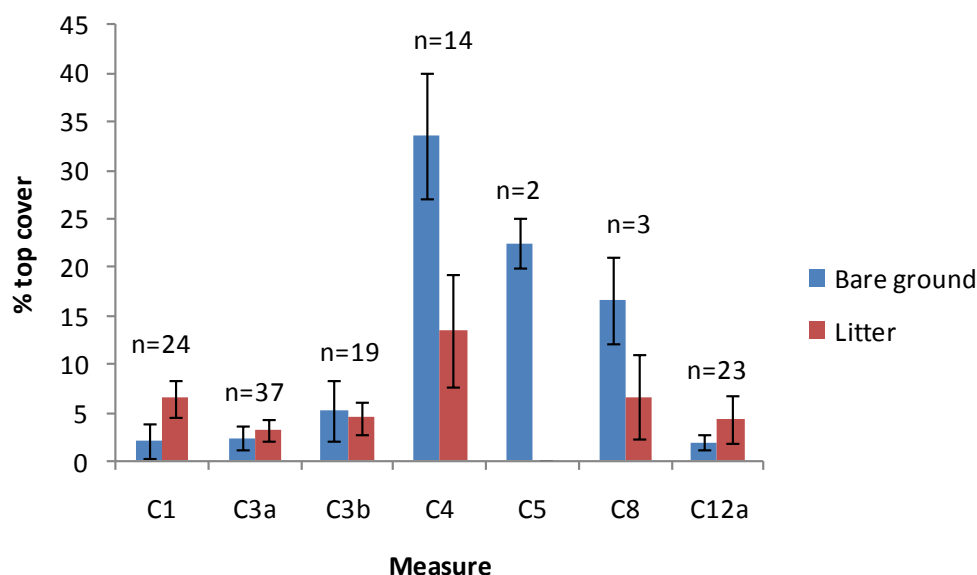


Figure 1 Percentage top cover of bare ground and litter in summer, with standard errors.

3.2.1 Common species

A total of 48 individual species were recorded on more than 10% of features (Table 6). Within-site abundance was lower than in 2010, with only three species recorded in more than 50% of quadrats where the species was found compared to 12 species in 2010. These species were only recorded on a small number of features.. Only one (*Lotus corniculatus*) of the 42 most common species is an axiophyte.

The most common species (in terms of frequency of recording across sites) were generally perennial grasses, although creeping thistle (*Cirsium arvense*) was recorded on the greatest proportion of features (Table 6). Generally, the most frequently recorded species were common species associated with uncropped farmland habitats. The pin hit measure of top cover indicated that four perennial grasses (*Dactylis glomerata*, *Festuca rubra*, *Lolium perenne* and *Arrhenatherum elatius*) and *Trifolium pratense* each represented over 5% top cover across all features assessed.

3.2.2 Species richness

Species richness in total and for each of the groupings, generally followed the same pattern across measures, although low replication for some measures meant that comparisons should be considered with caution. Data are presented for all measures where assessments were made, for comparison, however measures were not necessarily targeted at the specific environmental benefits assessed. Total species richness was similar for all measures except skylark plots (C4) where only 6.7 species per feature were recorded (Figure 2, Table 7), however it is not surprising that an ephemeral arable measure would have lower species richness. Only a small proportion of the species present were axiophytes (between 1.0 and 2.7 species across all measures) and these were usually recorded on few measures and at low abundance (Table 6, Appendix 1). Axiophytes were most common on C12a (pollen nectar mixtures) and C3a (reverted arable areas). The number of bird food plant species present was again similar across all measures except C4 (1.9 species), with an average of between 7.0 and 9.3 species on other measures. A slightly larger number of butterfly food plant species were recorded in uncropped measures (C1: grass buffers alongside watercourses; C3a: reverted arable areas; C3b: scrub management) than other measures that are likely to have been cultivated more recently.

Table 6 Most frequently recorded species and groupings with % frequency of sites at which they were recorded, % abundance within sites at which they occurred and % top cover across all features. Shaded species are axiophytes.

Common name	Latin name	% frequency	Mean % abundance when present	Mean % top cover
Creeping thistle	<i>Cirsium arvense</i>	66.4	25.54	3.24
Cock's-foot	<i>Dactylis glomerata</i>	52.5	42.95	7.91
Yorkshire fog	<i>Holcus lanatus</i>	52.5	33.36	4.29
False oat-grass	<i>Arrhenatherum elatius</i>	50.8	39.23	6.23
Red fescue	<i>Festuca rubra agg</i>	49.2	47.64	6.80
Perennial rye-grass	<i>Lolium perenne</i>	44.3	40.89	6.27
Couch	<i>Elytrigia repens</i>	41.0	27.10	2.34
Rough-stalked meadow-grass	<i>Poa trivialis</i>	36.9	28.40	0.53
White clover	<i>Trifolium repens</i>	36.1	44.93	5.41
Common nettle	<i>Urtica dioica</i>	36.1	25.00	0.04
Timothy	<i>Phleum pratense</i>	33.6	42.56	2.99
Cleavers	<i>Galium aparine</i>	33.6	19.88	0.90
Creeping buttercup	<i>Ranunculus repens</i>	32.8	22.63	1.19
Dandelion	<i>Taraxacum officinale</i>	32.0	22.10	0.57
Prickly sowthistle	<i>Sonchus asper</i>	31.2	19.60	0.04
Creeping bent	<i>Agrostis stolonifera</i>	30.3	28.44	1.88
Hogweed	<i>Heracleum sphondylium</i>	27.9	22.31	0.66
Barren brome	<i>Anisantha sterilis</i>	24.6	19.83	0.37
Ragwort	<i>Senecio jacobaea</i>	23.0	10.71	0.08
Broad-leaved dock	<i>Rumex obtusifolius</i>	23.0	9.99	0.45
Annual meadow-grass	<i>Poa annua</i>	21.3	23.64	0.25
Red clover	<i>Trifolium pratense</i>	20.5	48.20	0.49
Bird's-foot Trefoil	<i>Lotus corniculatus</i>	19.7	45.83	1.68
Black-grass	<i>Alopecurus myosuroides</i>	18.9	25.43	0.66
Spear thistle	<i>Cirsium vulgare</i>	18.9	9.13	0.41
Field speedwell	<i>Veronica persica</i>	18.0	19.09	0.00
Blackberry	<i>Rubus fruticosus agg</i>	17.2	17.38	0.57
Field bindweed	<i>Convolvulus arvensis</i>	16.4	17.50	0.29
Black medic	<i>Medicago lupulina</i>	15.6	26.05	0.29
Soft-brome	<i>Bromus hordeaceus</i>	15.6	15.26	0.20
Bristly ox-tongue	<i>Picris echioides</i>	15.6	13.68	0.33
Common bent	<i>Agrostis capillaris</i>	14.8	17.78	0.49
Greater plantain	<i>Plantago major</i>	14.8	15.83	0.12
Ash	<i>Fraxinus excelsior</i>	14.8	14.72	0.12
Field pansy	<i>Viola arvensis</i>	13.9	23.53	0.00
Scarlet pimpernel	<i>Anagalis arvensis</i>	13.9	22.94	0.41
Great willowherb	<i>Epilobium hirsutum</i>	13.9	10.00	0.20
Knotgrass	<i>Polygonum aviculare agg</i>	13.1	17.81	0.78
Wheat	<i>Triticum aestivum</i>	12.3	33.00	0.00
Scentless mayweed	<i>Tripleurospermum inodorum</i>	12.3	28.00	2.94
Ribwort plantain	<i>Plantago lanceolata</i>	12.3	22.00	0.37
Groundsel	<i>Senecio vulgaris</i>	11.5	18.21	0.20
Cow parsley	<i>Anthriscus sylvestris</i>	11.5	10.00	0.04
Common orache	<i>Atriplex patula</i>	10.7	27.31	0.82
Chickweed	<i>Stellaria media</i>	10.7	20.38	0.00
Shepherd's-purse	<i>Capsella bursa-pastoris</i>	10.7	19.62	0.33
Ground-ivy	<i>Glechoma hederacea</i>	10.7	13.85	0.04
Common mouse-ear	<i>Cerastium fontanum</i>	10.7	12.66	0.00

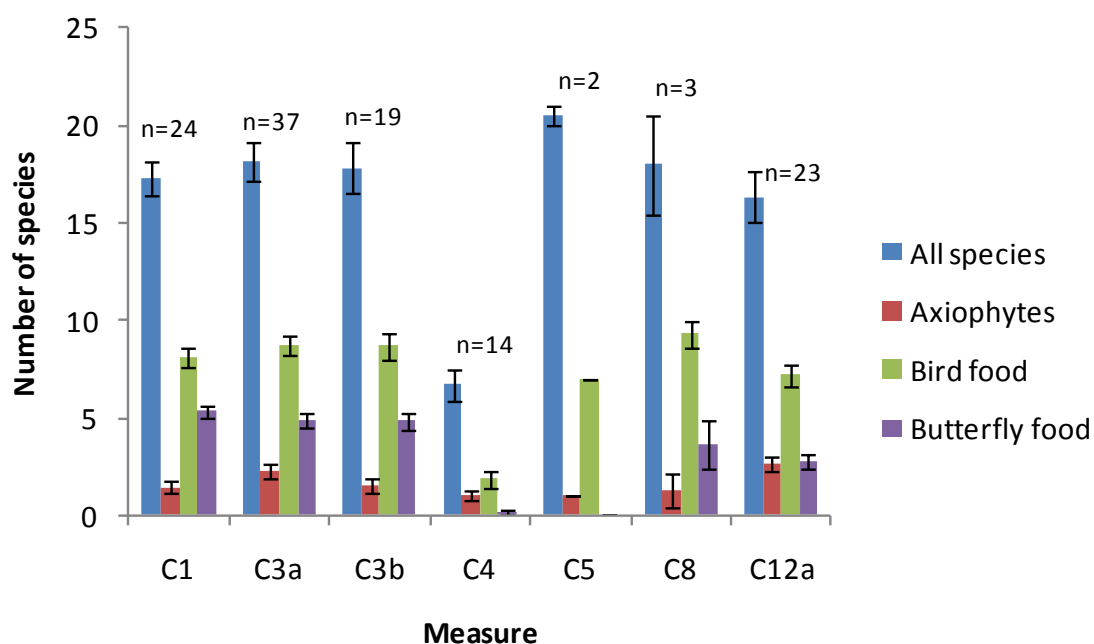


Figure 2 Number of species, number of axiophytes and number of bird and butterfly larval food plants present on different measures, with standard errors.

Table 7 Number of axiophytes and number of bird and butterfly larval food plants present on different measures as percentage of total numbers of plant species

Measure	Axiophytes %	Bird food species %	Butterfly food species %
C1	8.1	48.1	31.3
C12A	15.6	45.3	17.9
C3A	11.5	48.9	27.1
C3B	7.6	49.0	28.1
C4	14.2	27.3	3.6
C5	4.9	34.2	0
C8	6.4	53.4	19.4

3.2.3 Flower abundance

The number of live flowers present was recorded on 103 features (across C1, C3a, C3b, C12a). No flowers at all were recorded on seven of these, and on a further three only dead flowers were recorded. Mean abundance was calculated for an area 300 m² to allow comparisons with Carvell *et al.*, 2007. Pollination method was determined from Grime *et al.*, 1988.

A total of 123 species were recorded as having live flowers present at the time of the summer assessment on C1, C3a, C3b and C12a measures. An additional 9 species were recorded (to total 132 species with only dead flowers at the time of visit, these are shown in table Table 9 along with flowering time and duration (Grime *et al.*, 1988).

Table 8 Most abundant flower species with total abundance per 300 m² across all features assessed

Species	Total live flowers per 300 m ²	Pollination	Species	Total flowers per 300 m ²	Pollination*
<i>Trifolium pratense</i>	2115	I	<i>Trifolium pratense</i>	4938	I
<i>Lotus corniculatus</i>	1716	I	<i>Tripleurospermum inodorum</i>	4921	I
<i>Tripleurospermum inodorum</i>	1268	I	<i>Lotus corniculatus</i>	3277	I
<i>Sinapis arvensis</i>	1117	I/S	<i>Trifolium dubium</i>	1463	S
<i>Trifolium repens</i>	530	I	<i>Sinapis arvensis</i>	1154	I/S
<i>Borago officinalis</i>	524		<i>Trifolium repens</i>	1069	I
<i>Phacelia tanacetifolia</i>	243	I	<i>Cirsium arvense</i>	952	I
<i>Medicago lupulina</i>	241	I/S	<i>Sonchus asper</i>	780	I/S
<i>Cirsium arvense</i>	202	I	<i>Phacelia tanacetifolia</i>	711	I
<i>Trifolium hybridum</i>	175		<i>Borago officinalis</i>	535	
<i>Calendula officinalis</i>	171		<i>Rubus idaeus</i>	501	
<i>Senecio jacobaea</i>	125	I	<i>Medicago lupulina</i>	409	I/S
<i>Centaurea nigra</i>	106	I	<i>Veronica persica</i>	401	I/S
<i>Galega officinalis</i>	91		<i>Centaurea nigra</i>	253	I
<i>Cirsium vulgare</i>	87	I	<i>Picris echioides</i>	240	I/S
<i>Brassica napus</i>	81		<i>Trifolium hybridum</i>	200	
<i>Matricaria discoidea</i>	80	I/S	<i>Cirsium vulgare</i>	187	I
<i>Trifolium dubium</i>	75	S	<i>Galega officinalis</i>	171	
<i>Rubus fruticosus</i> agg. (g)	74	I	<i>Calendula officinalis</i>	171	
<i>Veronica persica</i>	74	I/S	<i>Senecio jacobaea</i>	155	I
<i>Picris hieracioides</i>	70		<i>Matricaria discoidea</i>	133	I/S
<i>Senecio erucifolius</i>	64	I	<i>Picris hieracioides</i>	124	
<i>Chamerion angustifolium</i>	39	I	<i>Leucanthemum vulgare</i>	116	
<i>Rubus idaeus</i>	31		<i>Onobrychis viciifolia</i>	107	
<i>Onobrychis viciifolia</i>	30		<i>Heracleum sphondylium</i>	95	I
<i>Vicia sativa</i>	29		<i>Brassica napus</i>	88	
<i>Pulicaria dysenterica</i>	28	I	<i>Anthriscus sylvestris</i>	87	
<i>Epilobium hirsutum</i>	26	I	<i>Rubus fruticosus</i> agg. (g)	80	I
<i>Stellaria holostea</i>	25		<i>Persicaria maculosa</i>	73	
<i>Senecio vulgaris</i>	25	S	<i>Senecio erucifolius</i>	69	I

* I = insect; S = self; W = wind

Table 9 Species with dead flowers only

Species	Flowering month	Flowering duration (months)
<i>Hyacinthoides non-scripta</i>	April	3
<i>Hypericum perforatum</i>		4
<i>Lactuca serriola</i>		
<i>Origanum vulgare</i>	July	3
<i>Pastinaca sativa</i>		
<i>Primula veris</i>	April	2
<i>Silene dioica</i>	May	2
<i>Stachys palustris</i>	July	3
<i>Symphytum officinale</i>	May	2

Those species that were present at a density of at least 25 flowers per 300 m² averaged across all features assessed are shown in Table 8. Shaded species are those that are included in the ten species most commonly visited by bees in a study by Pywell *et al.* (2005).

Flower abundance for live flowers was highest on C12a (27,438 flowers per 300 m²) and lowest on C3b (927; Figure 3). Species with the most abundant flowers for each measure are presented in Table 10. Counts of dead flowers were particularly high for C3b, with approximately 4 dead flowers recorded for each live one. In contrast, as well as producing the most flowers the ratio of dead to live flowers in C12a is approximately one to one.

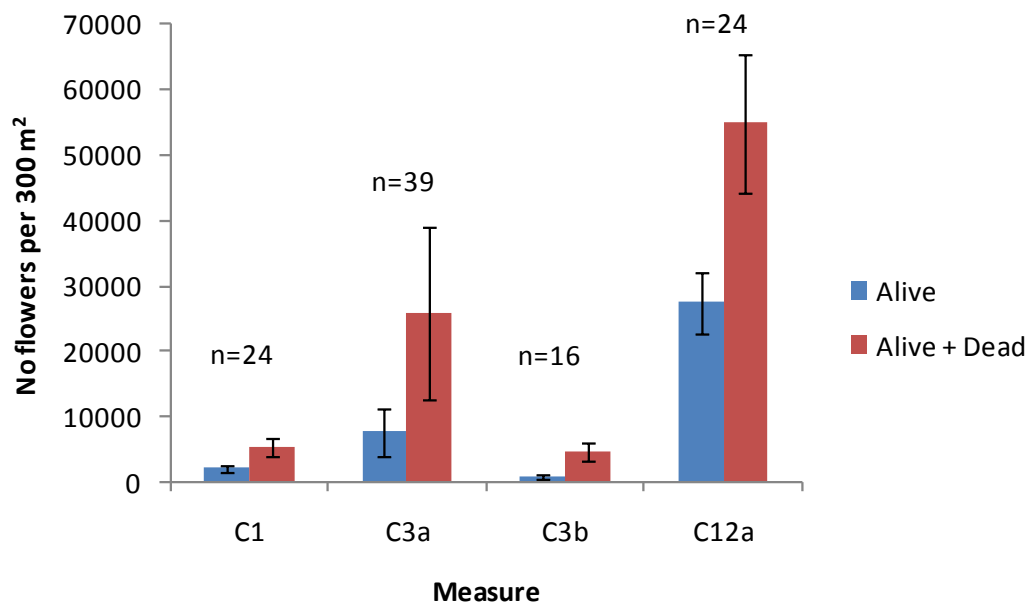


Figure 3 Flower abundance (per 300 m²) across relevant measures, with standard errors.

Table 10 Species with the most abundant live flowers

Measure	n	Species	Live flower abundance per 300 m ²
C1 (buffers)	24	<i>Lotus corniculatus</i>	429
C3a (reverted arable)	39	<i>Tripleurospermum inodorum</i>	3250
C3b (scrub management)	16	<i>Pulicaria dysenterica</i>	159
C12a (pollen & nectar)	24	<i>Trifolium pratense</i>	8928

3.3 AUTUMN CONDITION ASSESMENT RESULTS

A total of 85 features (stubbles C6 and C7a, wild bird seed mix C9 and game strips C10) on 27 farms were assessed during the autumn. A subset of 71 features was re-assessed in late winter to estimate the remaining food resources on these measures. These occurred on farms that were visited primarily to assess criteria related to resource protection.

3.3.1 Crop species composition and food resource in sown wild and game bird mixes

There were 26 unique crop species sown across all of the C9 sites assessed, and 22 across the C10 sites assessed. The species recorded in each of the two measures, C9 and C10 are shown in Table 11, ranked by the percentage of features in which each species was recorded. The average number of plants per 10 m² for each crop species is also shown, along with the number of features in which the species was recorded.

Table 11 Crop species most frequently recorded under C9 and C10

C9	n	%of features	Plants per 10 m ²	C10	n	%of features	Plants per 10 m ²
<i>Chenopodium quinoa</i> (Quinoa)	9	53	198	<i>Chenopodium quinoa</i> (Quinoa)	11	33	565
<i>Triticale</i> (× <i>Triticosecale</i>) Triticale	9	53	42	<i>Zea mays</i> (Maize)	11	33	100
<i>Brassica oleracea</i> (Kale)	8	47	129	<i>Panicum miliaceum</i> (White millet)	10	30	365
<i>Panicum miliaceum</i> (White millet)	8	47	46	<i>Phalaris arundinacea</i> (Reed canary-grass)	9	27	831
<i>Raphanus sativus</i> (Radish)	7	41	50	<i>Sorghum bicolor</i> (Sorghum)	6	18	89
<i>Linum usitatissimum</i> (Linseed)	6	35	71	<i>Brassica oleracea</i> (Kale)	5	15	73
<i>Sinapsis alba</i> (White mustard)	6	35	345	<i>Sinapsis alba</i> (White mustard)	4	12	18
<i>Phacelia tanacetifolia</i> (Phacelia)	4	24	62	<i>Amaranthus</i> sp. (Amaranth)	3	9	76
<i>Brassica</i> sp. (Kale, Turnip)	3	18	34	<i>Phacelia tanacetifolia</i> (Phacelia)	3	9	21
<i>Fagopyrum esculentum</i> (Buckwheat)	3	18	84	<i>Sorghum bicolor ssp</i> (Sorghum)	3	9	136
<i>Echinochloa frumentacea</i> (Japanese millet)	2	12	72	<i>Triticale</i> (× <i>Triticosecale</i>) Triticale	3	9	47
<i>Helianthus annuus</i> (Sunflower)	2	12	24	<i>Artemisia vulgaris</i> (Mugwort)	2	6	38
<i>Melilotus</i> sp. (Sweet clover)	2	12	70	<i>Linum usitatissimum</i> (Linseed)	2	6	54
<i>Panicum ramosum</i> (Red millet)	2	12	10	<i>Panicum</i> sp. (Millet)	2	6	58
<i>Amaranthus</i> (Amaranth)	1	6	84	<i>Setaria viridis</i> (Green foxtail grass)	2	6	87
<i>Atriplex patula</i> (Common Orache)	1	6	4	<i>Brassica rapa ssp rapa</i> (Turnip)	1	3	1

C9	n	%of features	Plants per 10 m ²	C10	n	%of features	Plants per 10 m ²
<i>Camelina sativa</i> (Cloth of gold)	1	6	272	<i>Brassica oleracea.</i> (Kale)	1	3	248
<i>Cichorium intybus</i> (Chicory)	1	6	28	<i>Camelina sativa</i> (Cloth of gold)	1	3	80
<i>Echinochloa</i> sp. (Barnyard grass)	1	6	106	<i>Fagopyrum esculentum</i> (Buckwheat)	1	3	4
<i>Hordeum</i> sp. (Barley)	1	6	356	<i>Helianthus annus</i> (Sunflower)	1	3	14
<i>Hordeum vulgare sens.str.</i> (Barley)	1	6	52	<i>Sinapis arvensis</i> (Charlock)	1	3	24
<i>Panicum</i> sp. (Millet)	1	6	354	<i>Triticum aestivum</i> (Wheat)	1	3	580
<i>Phalaris canariensis</i> (Reed canary-grass)	1	6	26				
<i>Setaria viridis</i> (Green foxtail grass)	1	6	132				
<i>Sinapis arvensis</i> (Charlock)	1	6	8				
<i>Sorghum bicolour</i> (Sorghum)	1	6	268				
<i>Triticum aestivum</i> (Wheat)	1	6	116				
<i>Zea mays</i> (Maize)	1	6	9				

The seed resource provided by each of the sown species is variable due to the size of the seed, the weight of each seed and the number of seeds provided by each seeding plant. The average number of seeds per sown crop species is shown in Table 12.

Table 12 **Number of seeds recorded in C9 and C10**

Species	n ¹	Mean seeds per plant ²	SE	Mean seed weight (mg)	Mean weight of seed per plant ²
<i>Amaranthus</i> (Amaranth)	4	3225.8	1332.6	0.5	1,613
<i>Brassica oleracea</i> (Kale)	4	333.4	32.5	4.75	1,584
<i>Brassica</i> sp. (Kale, Turnip)	2	1451.3	75.2	0.8	1,161
<i>Camelina sativa</i> ((Cloth of gold)	2	1198.5	949	0.9	1,079
<i>Chenopodium quinoa</i> (Quinoa)	23	1648.5	434.9	7.69	12,677
<i>Echinochloa</i> sp. (Barnyard grass)	1	463.3	0	1	463
<i>Echinochloa crus-galli</i> (Barnyard grass)	1	1178.2	0	1.3	1,532
<i>Echinochloa frumentacea</i> (Japanese millet)	3	119.8	48	0.6	72
<i>Fagopyrum esculentum</i> (Buckwheat)	2	316.9	220.2	10.05	3,185
<i>Helianthus annuus</i> (Sunflower)	2	106.7	55.7	30.6	3,265
<i>Hordeum vulgare</i> (Barley)	2	24.7	15.7	34.8	860
<i>Linum usitatissimum</i> (Linseed)	7	10.6	4.1	5.23	55
<i>Melilotus</i> sp. 0((Sweet clover)	1	522.1	0	3.4	1,775
<i>Panicum</i> sp. (Millet)	6	260.1	60.5	5	1,301
<i>Panicum miliaceum</i> (White millet)	13	41.7	12.8	3.47	145
<i>Panicum ramosum</i> (Red millet)	2	19.5	16.1	4.1	80
<i>Phacelia tanacetifolia</i> (Phacelia)	5	238.8	83.7	2.18	521
<i>Phalaris arundinacea</i> (Reed canary grass)	8	2.5	2.4	0.89	2
<i>Raphanus sativus</i> (Radish)	6	46.1	24.8	5.03	232
<i>Setaria</i> sp. (Foxtail grass)	4	417.4	352.1	3.68	1,536
<i>Setaria viridis</i> (Green foxtail grass)	1	1657.1	0	1.3	2,154
<i>Sinapsis alba</i> (White mustard)	10	233.4	79.2	4.81	1,123
<i>Sinapsis arvensis</i> (Charlock)	1	1013.5	0	1.2	1,216
<i>Sorghum bicolor</i> (Sorghum)	10	310.5	163.5	1.43	444
<i>Triticale</i> (× <i>Triticosecale</i>) Triticale	9	51.7	31.3	18.38	950
<i>Triticum aestivum</i> (Wheat)	3	22.4	9.7	27.2	609

¹ number of measures in which each of the crop species was recorded.

² averages include any non-seeding plants sampled (plants were selected at random whether or not they were seeding).

The seed resource provided for each measure was calculated using the individual crop plant densities within each measure, the average weight of the seed and the average number of seeds

per plant. This was done for each crop species within each measure, then a total seed weight was calculated for each measure (unit is grams per m²).

C9 and C10 measures were very variable in terms of plant number. As expected, the seed weight per unit area increased with the number of crop plants per unit area (Figure 4). Highest seed weights per unit area were observed in C10 areas; conversely a number of C10 areas had little or no seed present (Figure 6).

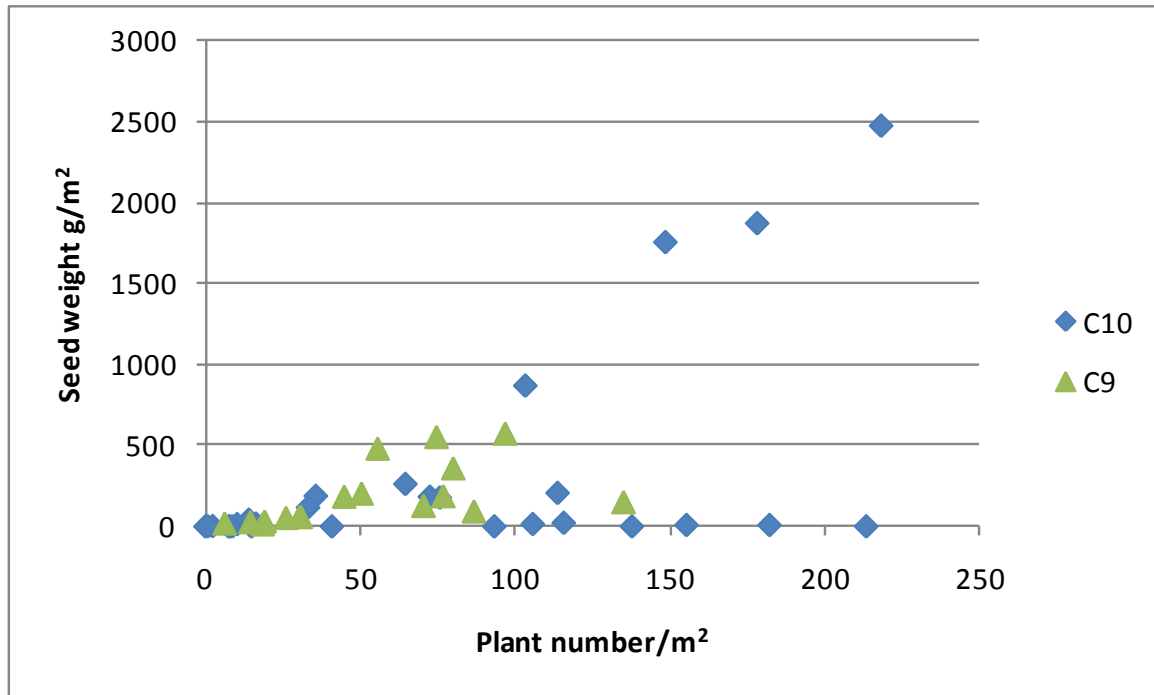


Figure 4 Seed resource and crop plant density

There was a large variation in the amount of food resource available in terms of seed mass (Figure 5 and Figure 6) or seed number (Figure 7 and Figure 8). Over half of C9 and a third of C10 features assessed contained more than 100 g seed m⁻² or 50,000 seeds m⁻². This is a marked increase on the 2010 results where around 30% of C9 and less than 10% of C10 features assessed exceeded these thresholds. Notably the measures that had the three highest seed counts in both C9 and C10 had high proportions of quinoa.

Average seed numbers per square metre were over 30,000 for C9 and 44,000 for C10. Seed counts from the second visits in late winter were very low, equivalent to 0.18% and 0.45% of autumn numbers for C9 and C10 respectively.

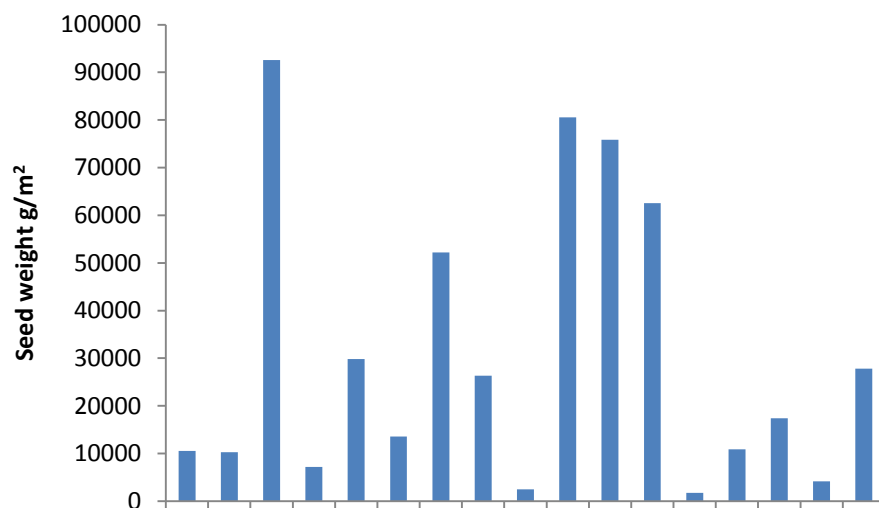


Figure 5 Seed weight per m² for C9 areas assessed

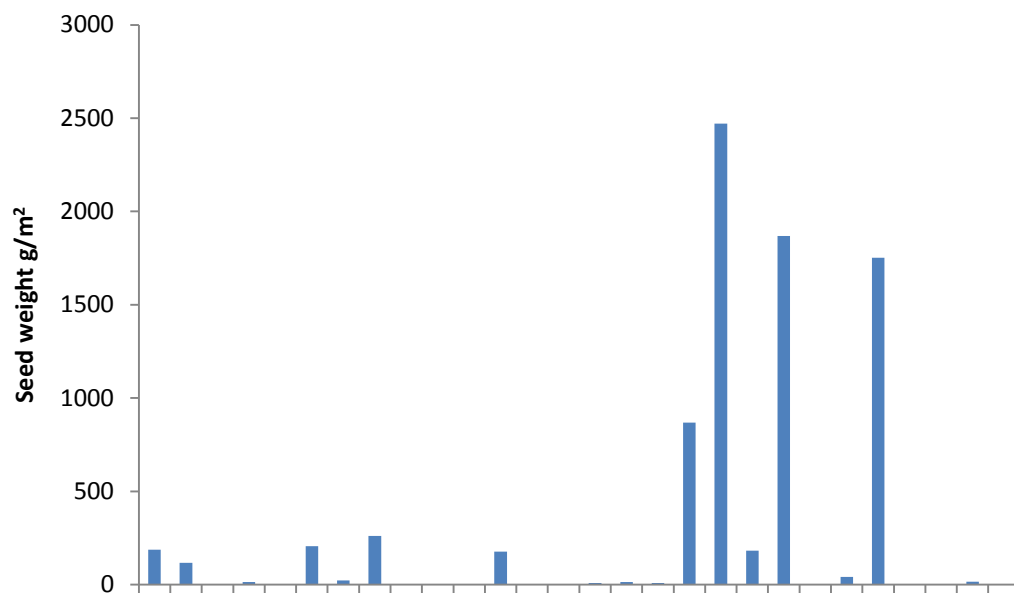


Figure 6 Seed weight per m² for C10 areas assessed

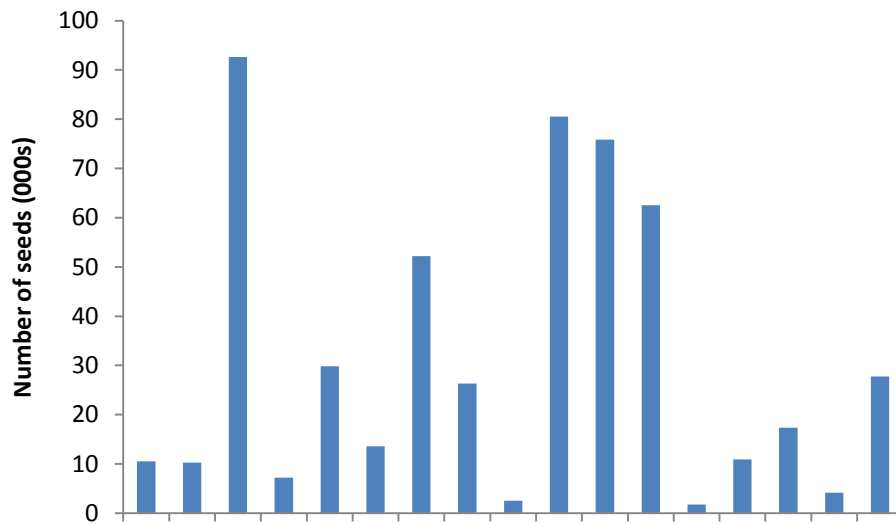


Figure 7 **Number of seeds per m² in C9 areas**

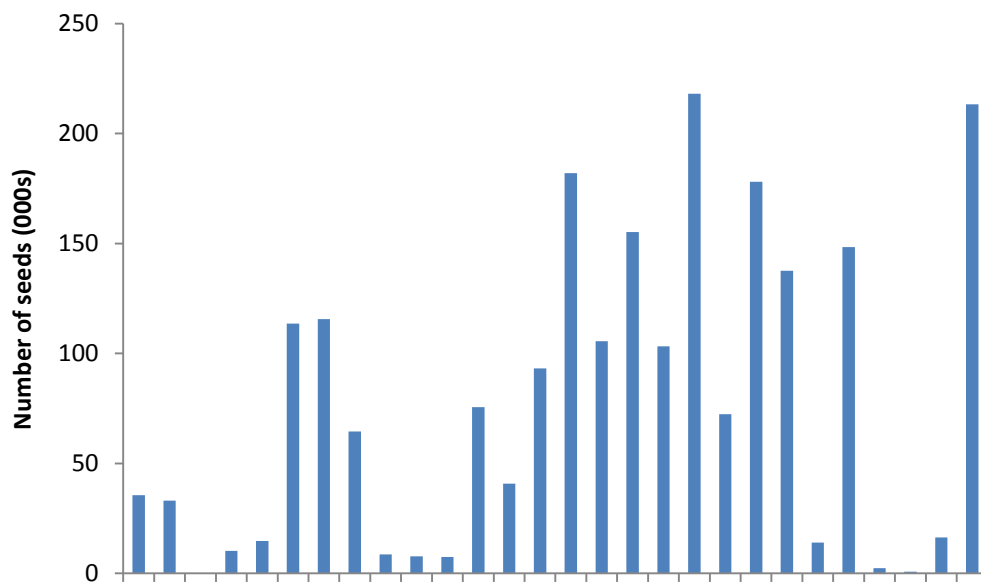


Figure 8 **Number of seeds per m² in C10 areas**

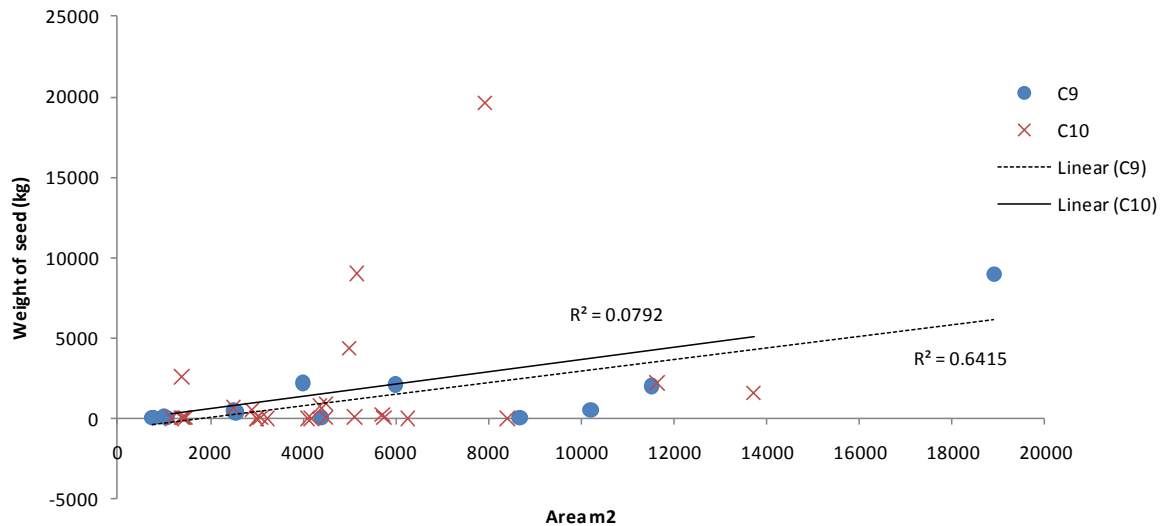


Figure 9 Weight of seed available in autumn on each measure in relation to the area of the measure

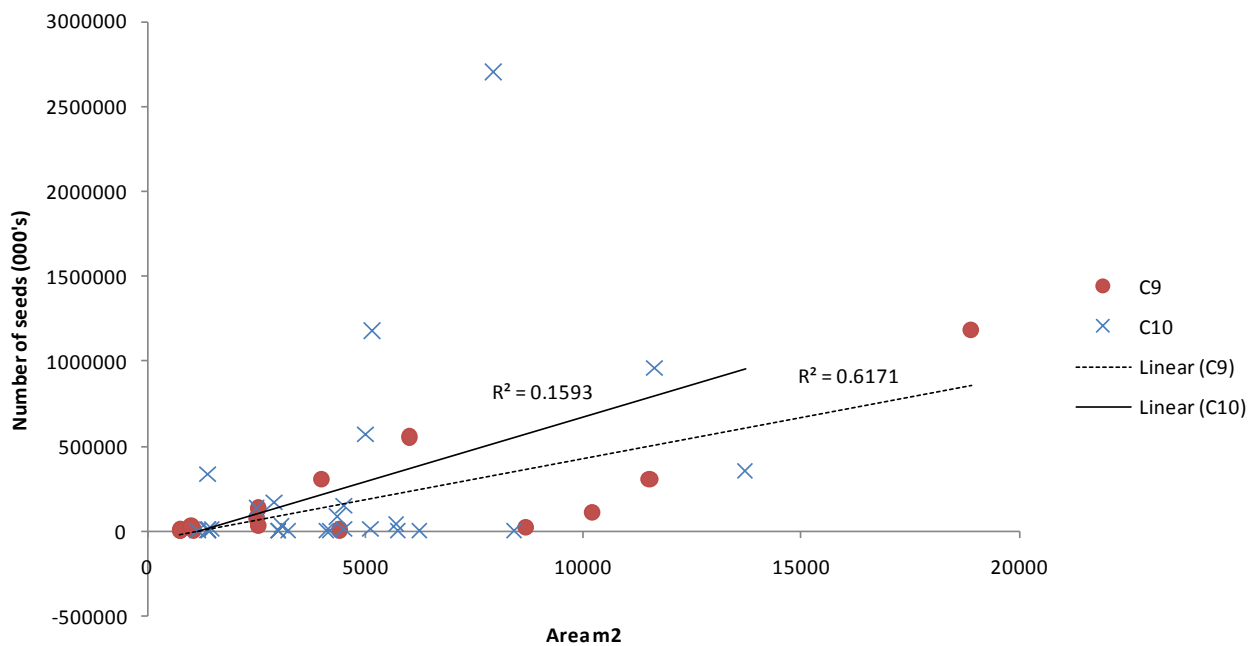


Figure 10 Number of seeds available in autumn on each measure in relation to the area of the measure

Both number and weight of seeds was related to area under each measure, but the correlation coefficient was low for C10 (Figure 9 and Figure 10). In the two examples of C10 with the highest values per unit area observed for seed weight (Figure 12) and seed numbers (Figure 13), most of the seed (99% of seed weight and 90-99% of seed number) was quinoa (*Chenopodium quinoa*).

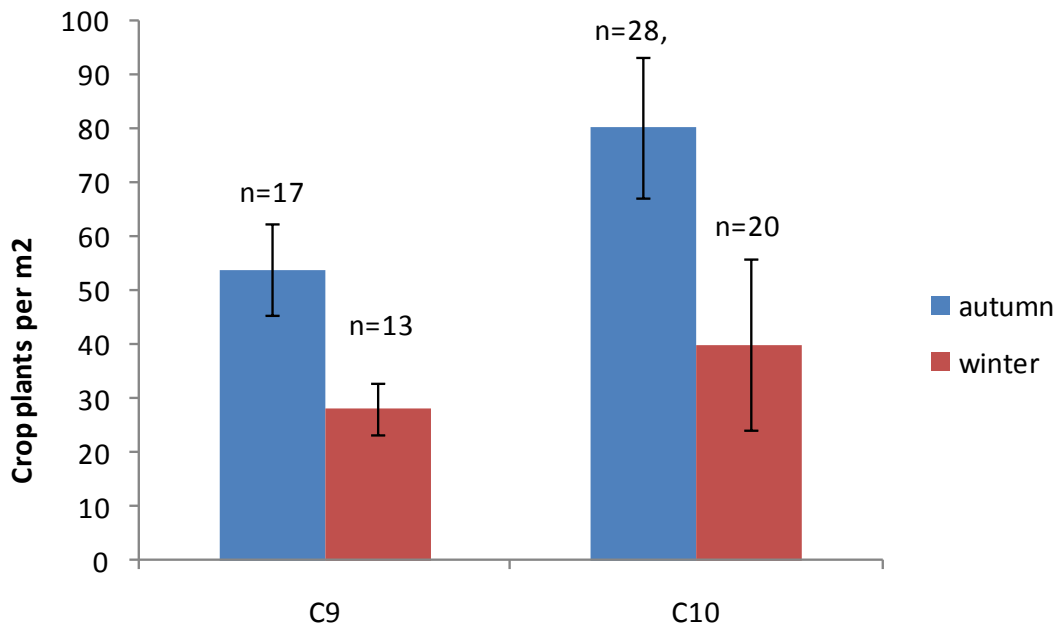


Figure 11 Decline in the number of crop plants present between the autumn and the winter visit.

3.3.2 Weed species present in sown mixes

In addition to the sown crop species, the weed community present within each C9 and C10 was recorded. Weeds also offer resources for birds through seeds and vegetative growth. A total of 70 unique weed species were recorded in C9s, with 27 of these species being listed as a food source for birds (Holland *et al.*, 2006). C10 areas had 70 unique weed species, with 23 of these providing a food resource for bird species. The most common weed species present are shown in

Table 13 and Table 14, along with bird species for which they feature in the diet. The weed species are listed in descending order by the number of features in which they were recorded as present. In both tables, mean percent cover is the average across the number of measures in which it was present (represented by n). There were large areas of bare ground within both measures (around 41% for both). The mean percent cover across all measures is presented in Figure 13.

Table 13 Most common weed species and associated bird species found in C9 areas

Weed species	n	Mean % autumn cover	Bird species
<i>Poa annua</i>	13	3.6	Collared Dove, Corn Bunting, Grey Partridge, House Sparrow, Reed Bunting, Skylark, Tree Sparrow, Yellowhammer
<i>Veronica persica</i>	11	4.2	
<i>Stellaria media</i>	9	2.8	Chaffinch, Grey Partridge, House Sparrow, Reed Bunting, Skylark, Stock Dove, Tree Sparrow, Woodpigeon
<i>Anagalis arvensis</i>	6	2.3	
<i>Viola arvensis</i>	6	0.5	Skylark
<i>Capsella bursa-pastoris</i>	5	0.3	Linnet
<i>Cirsium arvense</i>	5	5.4	Goldfinch
<i>Sonchus oleraceus</i>	5	2.0	Goldfinch
<i>Urtica dioica</i>	5	0.7	Corn Bunting
<i>Cirsium vulgare</i>	4	3.3	Goldfinch
<i>Epilobium spp</i>	4	10.6	
<i>Galium aparine</i>	4	2.7	
<i>Lamium purpureum</i>	4	0.3	Chaffinch, Reed Bunting, Skylark
<i>Lolium perenne</i>	4	6.9	
<i>Senecio vulgaris</i>	4	0.4	Chaffinch, Goldfinch, Greenfinch

Table 14 Most common weed species and associated bird species found in C10 areas

Weed species	n	Mean % autumn cover	Bird species
<i>Poa annua</i>	21	4.3	Collared Dove, Corn Bunting, Grey Partridge, House Sparrow, Reed Bunting, Skylark, Tree Sparrow, Yellowhammer
<i>Cirsium arvense</i>	16	2.1	Goldfinch
<i>Galium aparine</i>	13	1.1	
<i>Veronica persica</i>	13	1.3	
<i>Urtica dioica</i>	8	1.6	Corn Bunting
<i>Plantago major</i>	7	0.5	
<i>Rumex obtusifolius</i>	7	7.1	Chaffinch, Corn Bunting, Skylark
<i>Sonchus oleraceus</i>	6	2.1	Goldfinch
<i>Taraxacum officinale</i>	6	0.5	Goldfinch, Linnet
<i>Tripleurospermum inodorum</i>	6	3.4	
<i>Avena fatua</i>	5	11.1	
<i>Capsella bursa-pastoris</i>	5	5.0	Linnet
<i>Cirsium vulgare</i>	5	10.8	Goldfinch
<i>Epilobium spp</i>	5	0.8	
<i>Lamium purpureum</i>	5	1.0	Chaffinch, Reed Bunting, Skylark

3.3.3 Farmland birds and wider biodiversity

As can be seen from Figure 14, the average height of both C9s and C10s decreased significantly between the autumn and winter visit (height measured with a rule and drop disc were both used to measure the height of the canopy). In addition the number of seeding plants decreased from autumn to winter (Figure 11) with very few seeds being recorded on the plants in the winter as most of them had shed their seeds, although only plants still standing were counted and no attempt was made to sample seeds shed that remained on the soil surface.

Measures visited in the autumn and winter had large areas of bare ground and litter present, this increased from autumn to winter (Figure 12). In all measures bare ground and litter covered at least 30 percent of the area in winter.

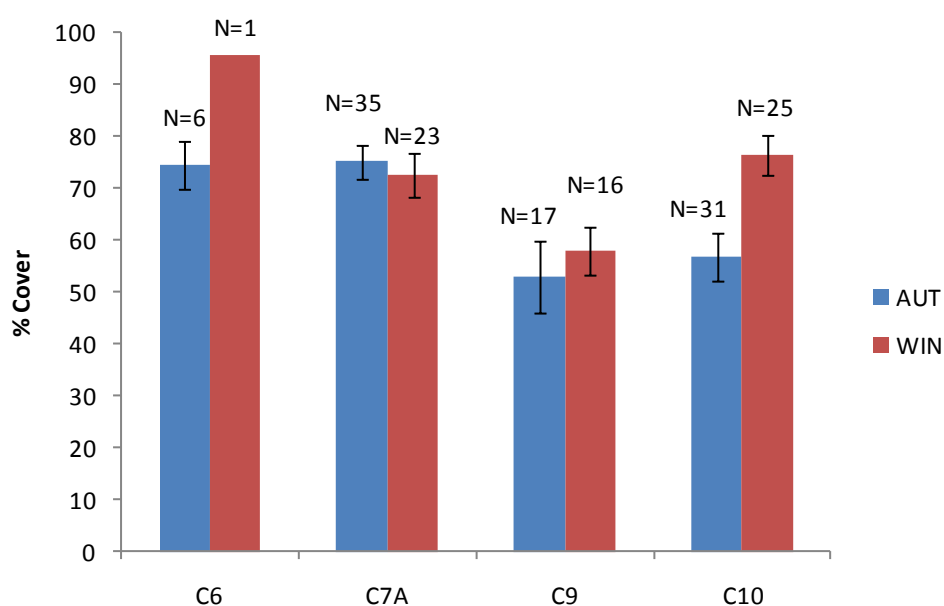


Figure 12 Mean bare ground and litter present on measures, with standard errors.

For the remaining cover the weed species that are of potential use to birds were selected (using Holland *et al.*, 2006). These were then filtered to contain only the plants that were recorded as seeding, dehiscent or flowering in summer, and seeding and flowering for the winter visits. The mean ground cover (as percentage) for each measure is shown in Figure 13.

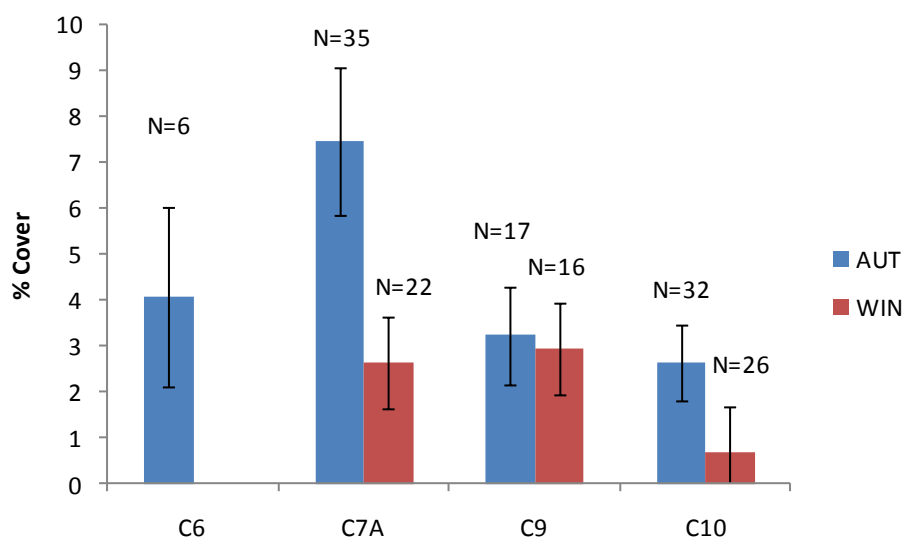


Figure 13 Mean percent weed cover of measure providing potential food for birds (i.e. evidence of flowering or seeding), with standard errors.

3.3.4 Height of vegetation

The height of vegetation in sown mixes was far higher in the autumn than in the winter as fewer crop plants were left standing (Figure 14). There were large variations in height both within a single measure and between the average heights of different examples of a measure.

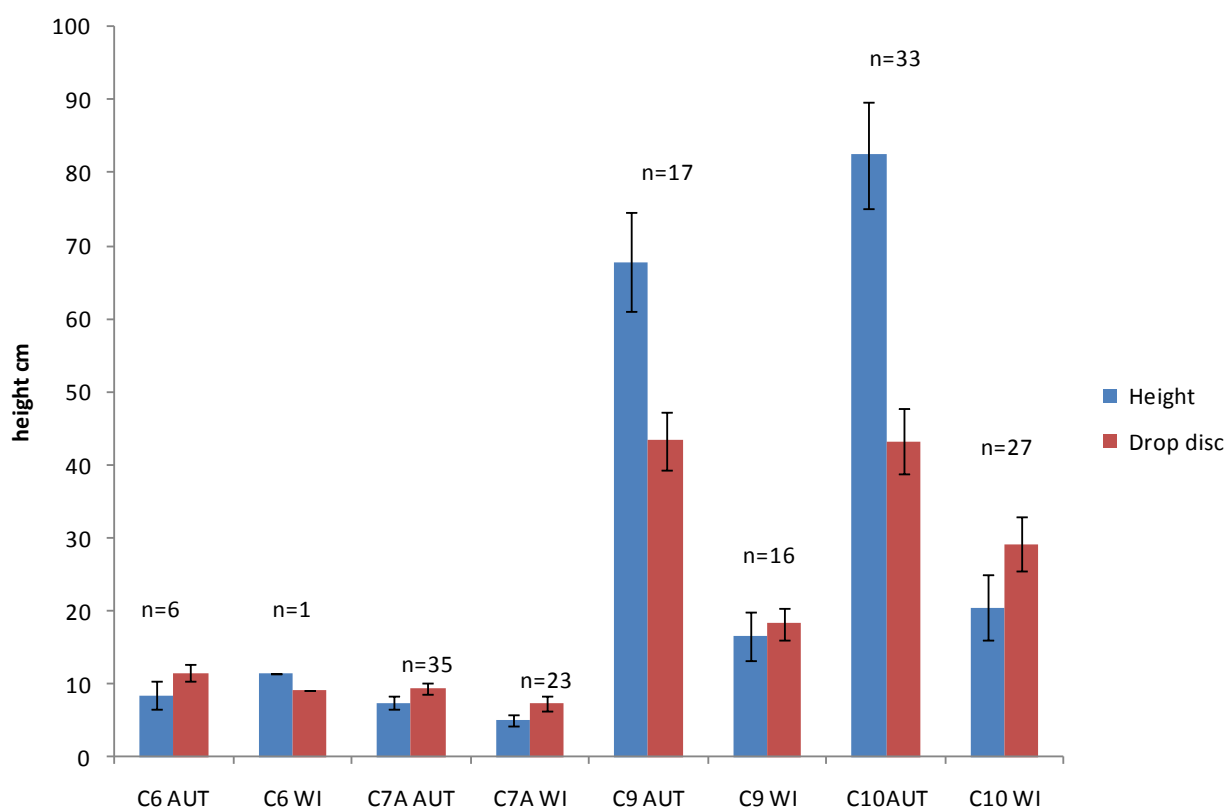


Figure 14 Mean height of vegetation within measure, with standard errors.

3.4 WINTER CONDITION ASSESSMENT RESULTS

3.4.1 Resource protection

A total of 82 features under measures C1, C2, C3a, C3b were assessed in late winter to estimate their value in terms of resource protection.

Half of the features assessed were adjacent to a water body (51%) of some description (stream, ditch, pond, reservoir) although four of the watercourses were dry at the time of survey. Most of the features adjacent to watercourses were C1 and C2, however 25% of features described by the farmer as C1 were not adjacent to a watercourse. Of the 40 features not adjacent to watercourses, 70% buffered hedges, woodland or stone walls from pollution, but the remainder bordered roads, gardens or no other feature.

Across all the measures assessed during winter, most features were strips (77%) rather than blocks. Mean strip width was between 5.6 and 15.9 m, however there was a lot of variation within measures (Figure 15). Around 60% of features under C1, C3a and C3b met the minimum width requirements, however only 28% of C2 features met the revised 2011 width requirement of 6 m (formerly 10 m). Only 17% would have met the original 10 m requirement.

Overall, C1 strips were narrower than C2 or C3a strips, perhaps reflecting the red box requirements which are only 5 m for C1, but 6 m for C2 and C3a. Mean strip width was particularly large for C3b. However, mean widths for all measures assessed here except C1 were large due to a small number of particularly wide strips in the sample. In fact the greatest proportion of C1 strips (63%) met the red box requirements compared to 60% of C3b strips, 57% for C3a and only 28% of C2 strips.

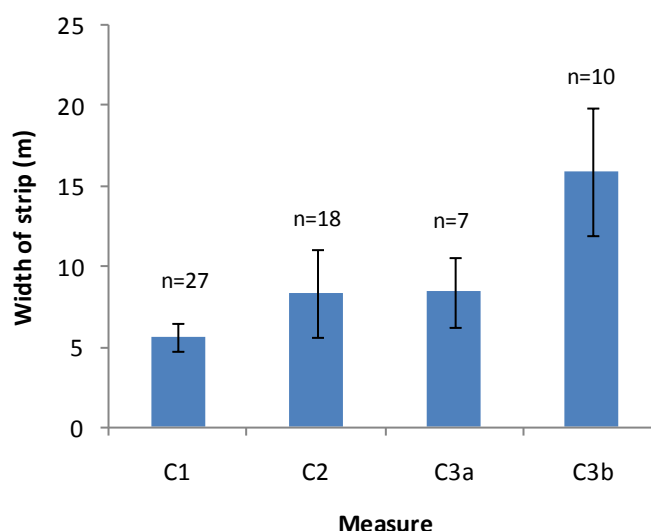


Figure 15 Width of buffer strips (measures present as blocks are excluded), with standard errors.

Overall, 40% of measures assessed were located at the bottom of a slope. A smaller but similar proportion (15-22%) were located across or down the slope or in flat fields (Table 15). Only three features, all C3a were at the top of the slope. Mean slope for different measures ranged from 2.7 to 5.3°

Table 15 **Number of measures assessed in relation to their position on a slope and mean slope for each measure**

Measure	<i>n</i>	Bottom	Across/ diagonal	Down slope	Top	Flat field	Mean slope (°)	SEM
C1	28	20	3	2	0	3	3.1	0.54
C2	21	9	2	5	0	5	4.9	1.06
C3a	19	3	5	7	3	1	2.7	0.61
C3b	14	2	2	4	0	6	5.3	1.41
Total	82	34	12	18	3	15	3.9	0.43

Those situated at the bottom of a slope would have greatest benefits for resource protection. However, where slopes are very steep ($>11^{\circ}$ on medium, chalk and limestone soils, or 7° on sandy and light silty soils; RPA/Defra 2010), water runs more quickly down the slope and buffer strips may not be able to slow the flow sufficiently to retain sediment or filter our pollutants effectively. In such circumstances additional measures may be required to limit soil erosion and pollution of watercourses.

The mean slope for features at the bottom of a slope was 4.0° (Table 16). Only small numbers of measures were recorded at the bottom of a slope for C3a and C3b. The slope of fields was highest for C2 and C3a, although only three features under C3a were sited at the bottom of a slope.

Table 16 **Slope of the field for measures situated at the bottom of a slope**

Measure	<i>n</i>	Mean	Min	Max	SEM
C1	20	3.2	0	12	0.59
C2	9	6.0	2	15	1.61
C3a	3	5.7	3	9	1.76
C3b	2	1.0	0	2	1.00
Total	34	4.0	0	15	0.61

The value of buffer strips is determined by their location. Greatest environmental benefits will be realised where buffers are situated adjacent to a water body, whereas areas designed to prevent erosion may reduce the potential for runoff at source, hence these measures may be most effectively situated away from a watercourse or other water body. In addition, an uncropped strip that crosses a slope could also reduce erosion and runoff. Visual assessment of measures indicated that areas under C1 were usually beneficial because most were adjacent to a watercourse or other water body (Table 17). 28% of areas under other measures were also adjacent to a watercourse, however only 13% of areas were placed beneficially for other reasons. In all, 64% (89% C1, 61% C2, 47% C3a and 43% C3b) were situated in potentially beneficial situations.

Table 17 **Number of areas likely to benefit resource protection with respect to location**

Measure	n	Adjacent to a watercourse	Adjacent to other water body	Intercept a slope	Intercept a natural drainage channel	Total
C1	28	20	1	3	1	25
C2	21	8	3	0	2	13
C3a	19	4	2	1	2	9
C3b	14	3	1	2	0	6
Total	82	35	7	6	5	53

Features assessed against resource protection criteria were on a range of soil textures, but nearly half were on light soils (46%), with only 20% on medium soil textural classes. Buffer strips will have greatest benefits on light or medium soils with relatively shallow slopes (see above). On heavy soils, buffer strips are less effective because soil particles tend to flow with water over the surface of the buffer strip into watercourses (RPA/Defra 2010). Alternative or additional measures may therefore be needed to limit erosion. Of the features surveyed, which were at the bottom of a slope, half were on light soils and nearly two thirds were on light or medium soils, with mean slopes within the range in which buffer strips would be effective. Features at the top or running down the slope (with little impact on erosion or run-off) were largely on heavy or light soils and those on heavy soils were on steeper slopes (Table 18).

Table 18 **Number of features on different soil types in relation to position and slope**

Position	n	Light		Medium		Heavy	
		No.	Mean slope (°)	No.	Mean slope (°)	No.	Mean slope (°)
Bottom	31	15	4.5	7	3.1	9	6.7
Across/diagonal	12	7	7.6	3	6.3	2	4.0
Down	18	6	2.2	4	4.5	8	4.3
Top	3	2	1.5	0	-	1	6
Flat field	15	6	0	2	0	7	0
Total	79	36		16		27	

There was evidence of some form of compaction on 41% of all features assessed. Apart from C3b where no compaction was recorded, a similar proportion of features had compaction across all measures assessed (Table 19). A slightly higher proportion (53%) than average of features situated at the bottom of a slope were compacted to some degree. However, compaction ranged from very light vehicle use that had compressed rather than destroyed vegetation, to the whole area being used as a track with resulting compaction across the strip.

Table 19 Numbers of measures where compaction was recorded in relation to the location of measures

Measure	n	Bottom	Across/ diagonal	Down	Top	Flat field	Total with compaction
C1	28	10	2	2	0	1	15
C2	21	6	0	3	0	0	9
C3a	19	2	1	3	3	1	10
C3b	14	0	0	0	0	0	0
Features assessed		34	12	18	3	15	

Where observation suggested that compaction was present, hand held penetrometers were used to assess the degree of compaction by comparing compacted and uncompacted areas. For C1 and C2 there were relatively small differences between these areas, suggesting that compaction was generally limited. However, there was a significant difference between compacted and uncompacted areas on C3a. Most compaction was a result of vehicle access, although horses also contributed on eight measures.

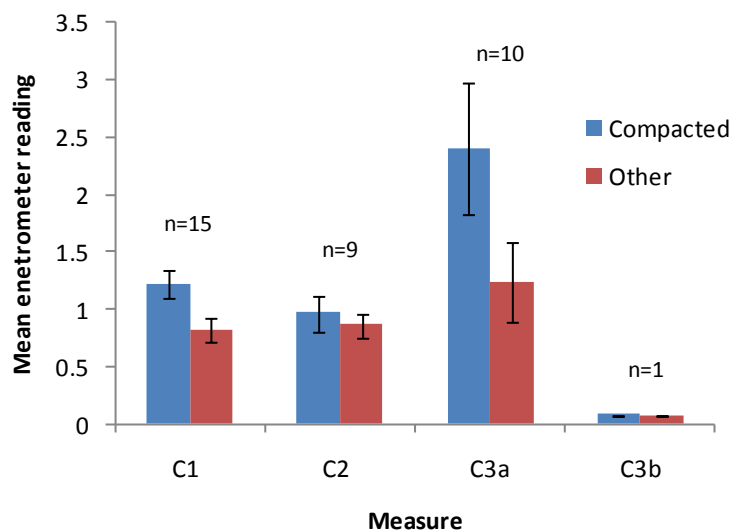


Figure 16 Penetrometer readings from compacted and uncompacted areas (from measures where compaction was present), with standard errors.

Vegetation cover was around two thirds of each measure for C1, C2 and C3a in late winter and 25% was litter. Litter cover was high and vegetation cover was lower on C3b because several features on one farm had a lot of dead plant material, although most was still attached to the plant. Lowest cover of bare ground occurred on C3a (3.6%) but was highest on C2 (12%). Around one third of the area was represented by litter (Figure 17).

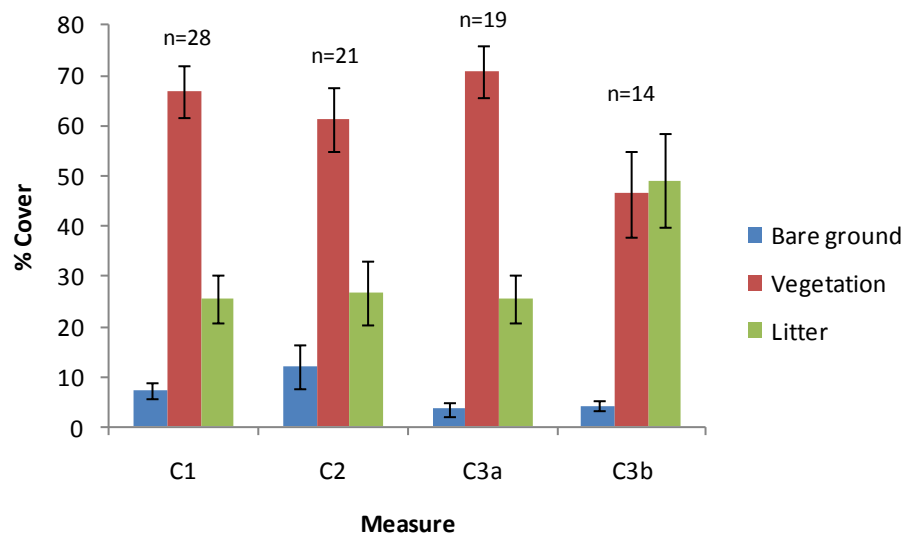


Figure 17 Cover of vegetation, bare ground and litter in February/March, with standard errors.

There was no evidence of any erosion or runoff either in the cropped area or on the adjacent strip under voluntary management, reflecting the very dry winter.

3.5 CONDITION SCORES

Results are presented for those measures that were encountered on the monitored farms, in relation to the environmental themes for which they are most relevant. Some measures were so rarely taken up that it was not possible to monitor them. The sampling procedure was described in Laybourn *et al.*, 2011. Results are presented for 2010 and 2011, to allow comparison between the two years.

In 2010, most of the environmentally managed areas available for assessment were those already present on farms before the start of the CFE, and the range of measures that could be assessed was limited. Much of what was available was former set-aside, classified as C3a, hence the large sample sizes recorded. In 2011, a better balance of measures was attained, but many were still taken up so infrequently that it was not possible to achieve a viable sample size. Sampling was therefore planned to optimise sample size for those measures that were sufficiently frequent to obtain a reasonable sample. However, in some cases it was found that certain measures had been recorded erroneously in the Defra survey, from which the sample was derived, or farms could not be visited, and so sample sizes were reduced below those intended.

Scores at farm level weighted per unit area relative to maximum possible scores are shown in Table 20 - Table 22. These scores relate to the specific themes in question, and should not be considered to be general measures of quality. This is because some attributes are scored differently for different environmental themes, and what is good for one may not be good for another. For example, C3a that is rotational or moved at least once every three years gets a score of one for farmland birds but zero for farmland wildlife, because short-term fallows are more likely to contain annual weeds, and an open vegetation structure with bare ground that most granivorous passerines favour for foraging. Conversely, long-term fallow is more likely to support a diverse non-avian fauna.

3.6 FARMLAND BIRDS

Analysis of variance was carried out on the ratios of scores to maximum scores, to test for statistically significant differences between years for those measures assessed in both years for which sample size was adequate (C3a, C9 and C10). For C7a, a non-parametric Mann-Whitney U test was performed as a large number of zero values meant that the data were skewed. There were no significant differences between score ratios in 2010 and 2011 for any of the measures tested.

3.6.1 In-field nesting

C3a is not identified in the CFE guide to voluntary measures as a measure targeted at farmland birds, but was one of the most widely adopted measures and has the potential to provide nesting habitat for ground-nesting species, so was scored for this theme. Scores as a percentage of the maximum were relatively low for C3a (reverted arable areas) in both years. The main criteria not fulfilled by C3a areas were amounts of bare ground (only one out of 59 in 2010 and 3/38 in 2011), desirable weed species (6/59 and 3/38) and short-term or rotational management (zero in both years). These are all related and reflect the fact that the areas assessed were all long-term fallows (equivalent to 'non-rotational' set-aside). Amounts of bare ground and annuals decline with increasing age of set-aside (Boatman *et al.*, 2011). Interviews with farmers indicated that many of areas classified as C3a were former set-aside and analysis of SPS data showed a much greater loss of rotational set-aside (83% between 2007 and 2008) than non-rotational set-aside (just under 50%; Langton, 2009).

Skylark plots (C4) and Fallow plots for ground-nesting birds (C5) were only analysed for 2011. Skylark plots scored over 70% of the maximum on average. Areas where lower scores were achieved included the density of plots (only 4/15 achieved the required density of 2/ha), presence of trees or woodland in the field boundary (only 7/15 did not have these) and insufficient weed cover (7/15 had weed cover within the prescribed limits).

Scoring for fallow plots for ground nesting birds (C5) was revised from that applied in the previous report (Boatman (2011), because feedback from the Evidence and Monitoring Group indicated that that lapwings are unlikely to nest in plots close to woodland or smaller than the minimum two

hectares, and so areas that did not meet one or other of the criteria for distance from trees/woodland or plot area should score zero. All 16 examples of C5 visited failed to meet one or both of these criteria and were therefore considered to have no value as nesting habitat for the target species.

Table 20 Mean ratios of scores to maximum scores at farm level for farmland birds in 2011

Measure	Year	Mean	Standard error	Number of farms	Total no. obs.
In-field nesting					
C3a Reverted arable areas	2010	43.6	2.75	23	59
	2011	40.5	3.06	19	38
C4 Skylark plots	2011	71.3	4.61	11	15
C5 Fallow plots for ground nesting birds	2011	0	-	7	16
Overwinter seeds					
C6 Stubbles followed by fallow	2010	78.4	8.44	2	4
	2011	78.4	5.46	4	6
C7a Overwintered stubble	2010	30.2	10.12	13	24
	2011	54.7	9.88	12	35
C9 Wild bird seed mixture	2010	53.1	4.03	12	22
	2011	60.5	3.84	12	17
C10 Game strips	2010	55.9	3.84	13	30
	2011	53.5	3.57	12	38
Insect-rich foraging areas					
C8 Uncropped cultivated margins	2011	85.4	2.09	2	3

3.6.2 Overwinter seeds

Scores as a percentage of the maximum were low for C7a (overwintered stubbles) in both years. The mean was higher for C7a in 2011, but the difference was not statistically significant at $P < 0.05$, though it was significant at $P < 0.1$. Further examination of the data for C7a indicate high coefficients of variation brought about by the fact that a number of the stubbles assessed were given a score of zero because pre-harvest desiccants or post-harvest herbicides had been used, which greatly reduces the value of the resulting stubble. This probably accounts for the fact that there was apparently no significant difference between years, as examination of the data indicates that there was apparently a considerable improvement between 2010 and 2011. In 2010, only nine out of 24 C7a stubbles had not been treated with herbicide, whereas in 2011, 27 out of 35 had not been treated.

Other areas where low scores were noted for C7a were desirable plant species cover and (in 2010) stubble height. In 2010, nine of 24 C7a stubbles met the criterion for cover of desirable plant species; in 2011, ten out of 35 met this criterion. In 2010, more than 30% of the area was less than 10cm high in 23 out of 24 stubbles, but only nine had more than 30% higher than 10cm. In 2011 however, 29/35 had more than 30% lower than 10cm, but 29/35 also had more than 30%

higher than 10cm, indicating stubbles of varying height. Many granivorous and insectivorous passerines prefer to feed in short stubbles, but some species such as skylarks and gamebirds prefer longer stubbles (Butler *et al.*, 2005). Hence stubble of variable height can provide suitable feeding habitat for a wider range of species.

Production of seeds by weeds in stubbles can ensure a supply of food for granivorous birds through the winter. Evidence of seeding was noted in 15 out of 24 (63%) C7a stubbles in 2010, and 19 out of 36 (54%) in 2011.

There were few stubbles followed by fallow (C6), but those that were assessed scored well in both years. None of the areas assessed had been treated with pre-harvest desiccants or post-harvest herbicides in 2010, however two had been treated in 2011. The main area where scores were not achieved was the presence of desirable plant species favoured by foraging granivores in winter (only 1/4 in 2010 and 1/6 in 2011 met the criterion). Also, only 2/4 in 2010 and 4/6 in 2011 showed evidence of seeding.

Additional attributes were added to the scoring system for wild bird seed mixtures and game strips (C9 and C10) as during the review process it was felt that the original scores did not adequately reflect the value of the measures on the ground. Under the revised system, these measures scored around 50-60% of the maximum scores, however most examples visited failed to meet some of the most important criteria.

Only 2/22 C9 examples in 2010 had 70% or more cover of sown crops, and only five had 50% or more cover of sown crops. In 2011, the situation was worse, with no areas having 70% or more cover of sown crops, and only four having 50% or more cover. In 2010, there were only three examples that met the revised criterion of having more than 40% of the crop plant area seeding, and in 2011 there were only two. Also, in 2010 only 6/22 C9s were 0.4 ha or larger, though 10 out of 17 met this threshold in 2011.

Percentage cover of sown crops was also a problem with C10 – only 4/30 in 2010 and 2/33 in 2011 met the 70% threshold, and only 5/30 in 2010 and 4/33 met the 50% threshold. In 2010 only 8/30 had three or more crop types, though 14/33 had three or more in 2011. In 2010 only three examples, and in 2011 only one, had more than 40% of the crop plant area seeding. In 2010 only 14/30 and in 2011 only 15/33 had the correct crop types (no maize or giant sorghum).

3.6.3 Insect-rich foraging areas

Only three examples of uncropped cultivated margins (C8) on two farms were encountered. All scored highly for farmland birds, with no consistent failings related to specific attributes.

3.7 FARMLAND WILDLIFE

As for birds, analyses of variance were carried out the ratios of scores to maximum scores to test for statistically significant differences between years for those measures assessed in both years for which sample size was adequate (C3a and C12a).

Invertebrates & non-arable flora

There was a very highly significant difference ($F=56.2$ with 39 d.f.; $P<0.001$) between years for C3a. This was mainly accounted for by differences in sward structure and presence of uncut margins (see below). C3a scores were considerably higher, as a proportion of the maximum score, in 2011 than in 2010. Note that C3a scores were also considerably higher for farmland wildlife (Table 21) than for farmland birds (Table 20), because of the different attributes and criteria considered relevant for these groups.

C3a scores were low in both years for forb flower abundance (13/56 in 2010, 15/38 in 2011) and undesirable weeds (19/56 in 2010 and 15/38 in 2011). Differences occurred however in sward structure. Two sward structure criteria were selected for scoring, based on Natural England guidance for managing neutral grassland sward condition to maintain value for plants and animals (Natural England, 2002). These are: (i) less than 10% of sward below 5 cm in June/July, and (ii) less than 20% of sward composed of tussocks more than 15 cm high. The first criterion was met by

most examples of C3a assessed (47/56 in 2010; 35/38 in 2011). However, in 2010 only 14 of the 56 areas assessed had less than 20% cover of tussocks more than 15cm high, but in 2011, 36 out of 38 areas assessed passed this criterion. Also, in 2010 only 14 out of 56 areas had margins left uncut, but in 2011 27 out of 38 had uncut margins.

Data for optional scrub management (C3b) were only available for 2011. Most C3b areas met most attribute criteria, but only 3/18 were cut in rotation, and only half (9/18) met the criterion for forb flower abundance.

Table 21 Mean ratios of scores to maximum scores at farm level for farmland wildlife in 2011

Measure	Year	Mean	Standard error	Number of farms	Total no. obs.
Invertebrates & non-arable flora					
C3a Reverted arable areas	2010	62.4	1.89	22	56
	2011	79.7	1.85	19	38
C3b Optional scrub management	2011	75.4	2.93	10	18
Arable flora					
C8 Uncropped cultivated margins	2011	63.0	5.81	2	3
Pollinators					
C12a Pollen & nectar mixtures	2010	67.3	3.5	5	7
	2011	65.4	4.33	14	24

3.7.1 Arable flora

Data for uncropped cultivated margins (C8) were only available for 2011. Scores for C8 areas were lower for farmland wildlife than for birds, mainly because none of the examples observed had any very rare plant species and only one had rare plant species present. Although the absence of rare species is not surprising, the conservation of rare arable flora was the original purpose for which this measure was designed (although there are other benefits), so wherever possible it should be implemented where populations of species of conservation interest are known or suspected to be present.

3.7.2 Pollinators

There was no significant difference between years for C12a. For C12a the main problem area, as for C9 and C10, was percentage cover of sown crops. In 2010, none of the seven examples had 75% or more cover of sown crops, and in 2011 only 8/24 met this criterion. In 2010, only 3/7 met criteria for flower abundance, cutting and removal of cuttings. Scores for these attributes were good in 2011 however, with 19, 21 and 16 out of 24 respectively meeting the criteria. Conversely, in 2011, only 10/24 had at least four crop types from among those listed in the guide to voluntary measures, whereas all those encountered in 2010 met this criterion.

3.8 RESOURCE PROTECTION

In the previous report dealing with condition scores (Boatman, 2011), scores for resource protection were only available for 2010/11. Data for 2011/12 were collected in January and February 2012 and are included here.

Previously, it was noted that, in 2010, scores for all three measures for which data were available were around 40-50% of the maximum, indicating room for improvement with respect to resource protection issues. Comparison of scores between the two years (Table 22) shows that scores in 2011 were higher than in 2010, between 53 and 63%. Differences between years were statistically significant for C1 and C3a, though not for C2.

Areas noted where criteria were not met for a substantial proportion of grass buffers along watercourses (C1) in 2010 included the following: removal of cuttings (only 2/32 met criteria), minimum 80% and 70% vegetation cover in winter (4/32 for both), location on high risk soil type (15/32), removal of compaction (10/32), 3m next to watercourse not cut every year (14/32), sward sown as opposed to naturally regenerated (14/32), and width of strip (16/32). In 2011, removal of cuttings (4/28), removal of compaction (9/28), cutting of 3m next to watercourse (9/28), and width of strip (12/28) were still low, but a greater proportion were sown (18/28) and 25/28 were located on high risk soil types.

Although only a few examples were available for assessment, the 2010 data indicated that grass areas to prevent erosion and runoff (C2) did not in general comply well with the criteria for the attributes relevant to resource protection. None of the six examples assessed had 80% vegetation cover in winter, only one had 70% vegetation cover, only two were sown and only one was located on a high risk soil type. Compaction had not been removed on any, nor had cuttings been removed. Only three were located along natural drainage pathways, and only three were at least 6m in width. In 2011, 8/21 exceeded 70% and 80% vegetation cover, 17/21 were sown, 16/21 were located on a high risk soil type, compaction had been removed on 10/21, and 11/21 were recorded as being located along natural drainage pathways. Comparison with 2010 needs to be made with care owing to the low sample size in the first year, but these figures do suggest some improvement between the two years. However in 2011, only five examples met the criterion for width of strip, and cuttings were not removed from any.

Table 22 Mean ratios of scores to maximum scores at farm level for resource protection in 2010/11

Measure	Year	Mean	Standard error	Number of farms	Total no. obs.
C1 Grass buffers alongside temporary and permanent watercourses	2010	47.8	4.33	13	32
	2011	62.9	4.53	12	28
C2 Grass areas to prevent erosion and runoff	2010	40.1	11.24	4	6
	2011	52.8	6.30	10	21
C3a Reverted arable areas	2010	41.3	2.96	16	47
	2011	57.5	4.69	10	19
C3b Scrub management	2011	47.6	5.43	7	14

In 2010, only 9/47 C3a areas had more than 80% vegetation cover in winter, though 17/47 had more than 70% vegetation cover. Only 16/47 were sown and 16/47 were on a susceptible soil type. Only 12/47 were located alongside a watercourse or along a natural drainage channel, compaction had been removed from only 11/47, and cuttings removed from only 5. 24/47 showed signs of access by wheeled vehicles. In 2011, 11/19 had 70% and 80% or more vegetation cover, 12/19 were sown, compaction had been removed from 15/19, and only five showed signs of access by wheeled vehicles. However, only six were located alongside a watercourse or along a natural drainage channel, only seven were on a susceptible soil type, and cuttings had only been removed from four. Bearing in mind that C3a is a multi-functional measure, resource protection is not the only factor to be taken into account in deciding on location and so overall these figures can

be considered to indicate a significant improvement between the two years in terms of management factors affecting resource protection issues.

Data for C3b (Scrub management) were only available in 2011. Scores were low for a number of attributes important for resource protection. Only four out of fifteen examples were located along a watercourse, across a slope above a watercourse or along a natural drainage path. Seven were on susceptible soil types, but only two were on slopes within the prescribed range. Only two had 80% or more vegetation cover, and five had 70% or more. Six were sown and action had been taken to remove compaction on only one.

These results are perhaps not surprising as C3b is a multifunctional measure and also by definition a long-term habitat that is unlikely to have been established specifically in response to the CFE, or for resource protection purposes. Benefits for resource protection should perhaps be regarded as value added from areas managed primarily for other purposes.

4. DISCUSSION

In 2011, a wider range of measures was available for assessment than in 2010. However, take up of some measures was still very low, and insufficient examples were available to provide an adequate sample for assessment of C7b, C12b, C13, C14 and C15. In considering the results it must be borne in mind that only some of the areas assessed were created or managed specifically as voluntary measures according to the farmer guidelines. Interviews carried out in spring indicated that in 2011, 39% of farmers with voluntary measures in the CFE would not have undertaken the management otherwise, compared to only 8% in 2010 (Laybourn *et al.*, 2011).

4.1 WIDER BIODIVERSITY

Plant species most commonly recorded on measures assessed in summer were largely perennial species and usually grasses. Species composition was similar to 2010.

On average, around half of the species present on C1, C3a, C3b, C8 and C12a, and a third of those on C5 were potentially bird food plants. The lowest proportion was on C4 (skylark plots; 34%). Around 30% of plant species in C1, C3a and C3b were butterfly larval food plants, and just under 20% in C12a and C8. These are similar to assessments of set-aside (Boatman *et al.*, 2009).

Scores for measures intended to benefit farmland wildlife were generally high (around 2/3-3/4 of the maximum possible scores). Significant differences in C3a scores between 2010 and 2011 were linked to differences in sward structure and cutting of margins. The guidelines for management of voluntary measures suggest leaving margins uncut in the 'green box' recommendations, but specific advice on sward structure is not provided. The results suggest that C3a areas were managed through cutting and/or grazing to a greater extent in 2011 than 2012. Guidance on management is somewhat confusing. Light grazing or an annual cut are prescribed under red box requirements, however in the green box guidance it is stated that cutting is only needed if scrub development is to be prevented. Simpler guidance with greater clarity could help to achieve objectives. However, different taxa benefit from different cutting regimes, so ideally guidance could give alternative approaches to management where environmental objectives vary according to local conditions or preferences.

Average densities of live flowers and total (live plus dead) were similar in 2010 for C3a, but considerably greater in 2011 for C12a. Carvell *et al.* (2007) showed that the log number of bumble bees increased linearly with log numbers of flowers up to 10,000 per 300m², but in 2011, over 27,000 live flowers per 300 m² were recorded on average in C12a. The majority of C12a areas examined exceeded 30 flowers per m². As in 2010, numbers in C1 and C3b were considerably lower.

4.2 FARMLAND BIRDS

Two measures are designed to provide in-field nesting areas for ground-nesting birds. Skylark plots (C4) were developed, as their name suggests, specifically for skylarks, whilst Fallow plots (C5) were developed for lapwings and stone curlews, but may also benefit other species such as skylarks, corn buntings, linnetts and yellowhammers (MacDonald *et al.*, 2012).

Skylark plots generally scored well, but density was often inadequate. Few examples achieved the recommended density of two per hectare, and in a number of cases there was only one per field. In four cases it appeared that the plots had not been deliberately created, i.e. were drill misses or the result of crop failure. Whilst such patches may still provide a small benefit, impacts on skylark populations are only likely to occur if the plots are implemented at a reasonably high density.

A number of fields with skylark plots in also had trees or woodland in the field boundaries. Skylark densities are negatively related to boundary height, though the effect is reduced in large fields (Whittingham *et al.*, 2003). Therefore it is recommended that small fields with tall boundaries are avoided.

Lapwings are also less likely to nest near trees or woodland (Chamberlain *et al.*, 2009). None of the C5 plots were considered suitable as habitat for ground-nesting birds, because they were too small, too close to woodland/trees, or both. All except one were in fact located in boundaries, and all except two were narrow strips. It seems that the farmers involved had not understood the concept of fallow plots. The CFE guide to voluntary measures does not explicitly state that fallow plots should not be placed at field edges, but it does say that they should be at least 100m wide and well away from trees and woodland.

Stubbles can be a valuable source of food for seed-eating birds in winter, if managed appropriately. Vickery *et al.* (2005) found that most of the variation in the number of granivorous species using stubbles was explained by the seed densities of Chenopodiaceae and Polygonaceae, and the number of chemicals used on the previous crop. Pre-harvest desiccants and post-harvest herbicides are particularly detrimental as they are non-selective and will remove any weeds that have survived earlier herbicide applications. Two out of 6 examples of C6 (overwintered stubbles followed by spring/summer fallow) and eight out of 35 examples of C7a (overwintered stubble) had been treated with a pre-harvest desiccant or post-harvest herbicide. However, for C7a this represented a considerable improvement on 2010, when 15 out of 25 had been treated with herbicide.

Late winter is a particularly crucial time for granivorous birds as food is often short at this time of year (Siriwardena *et al.*, 2008). Average percentage cover of weed species providing potential food for birds was around 4% for C6 and over 7% for C7a, but by late winter this had become negligible for C6 and reduced to less than 3 for C7a. Only one of 12 farms visited in autumn/winter indicated that stubbles would be cultivated before 15 February. Comparison with the previous year is difficult because the retention date for stubbles was changed from 1 March to 15 February.

Stubble height influences the use of stubbles for feeding by birds, with different species preferring short or longer stubbles (Butler *et al.*, 2005). The ideal therefore is to have variation in height across the field, and this was observed in the majority of stubbles (29/35) in 2011.

Measures C9 (Wild bird seed mixture) and C10 (Game strips) are specifically designed to provide food resources for birds during the autumn and winter. These were highly variable in the provision of food. Percentage cover of sown crops was often low, and proportion of crops seeding was also often low, resulting in low seed weights and numbers. Positive relationships were observed between seed weight and crop plant density, also between seed weight and plot area, but with large amounts of variability. Some examples of C10 had high plant densities but little or no seed, because inappropriate crop species such as maize were sown. However a number of features were providing significant food resources, illustrating that if a suitable range of species are sown and establishment is good, then sown bird mixes can be effective in delivering resources in the autumn. Information relating bird numbers to seed resources from sown crops in the literature is sparse, but studies indicate that birds do not feed in stubbles with fewer than 250-300 seeds/m² (Moorcroft *et al.*, 2002; Robinson *et al.*, 2004). Average seed numbers measured in the autumn were over 30,000 for C9 and 44,000 per square metre for C10, but by late winter they were only 55 and 198 respectively. However, it should be noted that these were seeds retained on the plant, and there may still have been substantial numbers of seeds on the soil surface. It was not possible to assess these within the time available.

Weed species present in wild bird seed mixtures and game strips will also contribute to bird food resources. Cover of weeds providing potential food for birds (i.e. flowering or seeding) was similar in C9 to that observed in C7a stubbles in late winter. Weed levels in game strips were lower, possibly because of the more competitive nature of crops sown, or more effective herbicide use. Herbicide use is difficult in mixed crops, because of differing susceptibility, but game crops are often composed of only one species or two related species (e.g. maize and millet), which can be treated with selective herbicides.

A considerable proportion of plant species present in other measures were potentially capable of providing food for bird species. Where the vegetation was relatively open, for example in recently sown pollen and nectar or wildflower mixtures, these may provide valuable foraging opportunities. However, there were few gaps in the swards on many features that had been established for a

number of years (commonly C1 and C3a), which may limit their suitability for foraging birds Douglas *et al* (2009).

4.3 RESOURCE PROTECTION

Measure C1 is entitled 'grass buffers alongside temporary and permanent watercourses', and is intended primarily for resource protection, yet only 20 out of 28 (71%) of examples of this measure were actually next to watercourses. Another one was next to a still water body. Of the other measures assessed for resource protection, 52% (C2) and 32% (C3a) and 29% (C3b) were adjacent to watercourses or other water bodies. Few were positioned so that they intercepted a drainage channel or across a slope. C1 and C2 are the measures designed specifically for resource protection, and of these, 89% of C1 but only 61% of C2 areas were considered to be in locations that would have significant benefits in terms of reducing erosion or limiting losses of pollutants to watercourses. Some farmers may have misunderstood the aims of these measures, particularly C2, or the areas may have originally been established for different purposes. For C3a and C3b the figures were 47% and 43%, however these are multi-functional measures with resource protection being only one of the objectives.

In terms of scores, these increased for C1, C2 and C3a between 2010 and 2011 and for C1 and C3a these increases were significant. C1 scores increased to nearly 63% in 2011, which suggests that the majority of those implementing buffer strips now have a good understanding of how to manage them. C2 had the lowest scores of the three despite being specifically designed to target resource protection issues. This type of measure is more recent and the concepts underlying it are more complex; it appears that there is still scope for improving the messaging here.

The increases in scores for C3a areas are particularly gratifying as this is a multi-functional measure and resource protection would not be expected to be the primary motivation for location and management in many cases.

In summary, the increased scores in 2011 compared to 2010 are good news but assessments indicate that there is still potential to further improve the location and management of measures targeted at resource protection

4.4 CONCLUSION

The results reported here reveal improvements in a number of areas in 2011 compared to 2010. However, there is still scope for additional improvements if the intended environmental benefits of the Campaign are to be fully realised, and it is to be hoped that the monitoring programme in 2012 will reveal further progress.

5. REFERENCES

- Boatman N, Conyers S, Jones N & Pietravalle S. 2009. Botanical field survey of set-aside and other uncropped land: further analysis 2009. Report to Defra.
- Boatman N, Jones N, Conyers S & Pietravalle S 2008. Monitoring and evaluation of zero rate set-aside in 2008 – assessing the botanical interest of set-aside and other uncropped land. Report to Defra.
- Boatman N. 2010. *Campaign for the Farmed Environment: Field Verification of Campaign Uptake and Delivery of Environmental Benefits - Scoping Study: Defining Field Assessment criteria for Data Collection*. Report to Defra.
- Boatman, ND (2011) *Supplement to CFE Annual report on monitoring of voluntary measures 2011: methodology for analysis and reporting of habitat condition monitoring data and inferred outcomes*. Food and Environment Research Agency report to Defra and the CFE Evidence and Monitoring Group. September 2011
- Boatman, N., Layourn, R, Pietravalle S. 2011. *Campaign for the Farmed Environment: Campaign for the Farmed Environment: Supplementary report: condition scores for 2010 and 2011, and implications for CFE environmental outcomes*. Report to Defra, December 2011.
- Butler, SJ, Bradbury, R.& Whittingham, MJ. 2005. Stubble height affects the use of stubble fields by farmland birds. *Journal of Applied Ecology* **42**: 469-476.
- Carvell C, Meek WR, Pywell RF, Goulson D & Nowakowski M. 2007. Comparing the efficacy of agri-environment schemes to enhance bumble bee abundance and diversity on arable field margins. *Journal of Applied Ecology* **44**: 29-40.
- Carvell C, Meek WR, Pywell RF, Nowakowski M. 2004. The response of foraging bumblebees to successional change in newly created arable field margins. *Biological Conservation* **118**: 327-339.
- Chamberlain D, Gough S, Anderson G, MacDonald M, Grice P & Vickery J 2009. Bird use of cultivated fallow 'Lapwing plots' within English agri-environment schemes. *Bird Study* **56**: 289-297.
- Douglas DJT, Vickery JA, & Benton TG 2009 Improving the value of field margins as foraging habitat for farmland birds. *Journal of Applied Ecology*, **46**, 353-362.
- Grime JP, Hodgson JG & Hunt R. 1988. Comparative plant ecology: a functional approach to common british species. Unwin Hyman, London, UK. 742 pp.
- Holland JM, Hutchison MAS, Smith B & Aebischer NJ. 2006. A review of invertebrates and seed-bearing plants as food for farmland birds in Europe. *Annals of Applied Biology* **148**: 49-71.
- Laybourn R, Jones N, Boatman N. 2011. Campaign for the Farmed Environment: *Field Verification of Campaign Uptake and Delivery of Environmental Benefits*. Annual Report, October 2011. 61pp.
- MacDonald MA, Maniakowski M, Cobbold G, Grice PV & Anderson GQA (2012. Effects of agri-environment managment for stone curlews on other biodiversity. *Biological conservation* **148**: 134-145.
- Moorcroft D, Whittingham MJ, Bradbury RB & Wilson JD 2002. The selection of stubble fields by wintering granivorous birds reflects vegetation cover and food abundance. *Journal of Applied Ecology*, **39**, 535-547.
- Natural England 2002. *Illustrated guide to grassland condition: Neutral grassland for plants and animals*
- Pywell, R.F., Warman, E.A., Carvell, C., Sparks, T.H., Dicks, L.V., Bennett, D., Wright, A., Critchley, C.N.R.& Sherwood, A. (2005). Providing foraging resources for bumblebees in intensively farmed landscapes. *Biological Conservation* **121**: 479-494.

- Robinson RA, Hart JD, Holland JM & Parrott D 2004 Habitat use by seed-eating birds: a scale-dependent approach. *Ibis*, **98**, 2.
- RPA/Defra 2010. *Single Payment Scheme Cross Compliance Guide for Soil Management*, 2010 edition.
- Siriwardena, G.M., Calbrade, N.A. & Vickery, J.A. (2008). Farmland birds and late winter food: does seed supply fail to meet demand? *Ibis* **150**: 585-595.
- Smart SM, Firbank LG, Bunce RGH & Watkins JW. 2000. Quantifying changes in abundance of food plants for butterfly larvae and farmland birds. *Journal of Applied Ecology* **37**: 398-414.
- Vickery JA, Atkinson PW, Marshall JM, West T, Norris K, Robinson LJ, Gillings S, Wilson A & Kirby W 2005. *The effects of Different Crop Stubbles and Straw Disposal Methods on Wintering Birds and Arable Plants*. BTO Research Report 402. BTO, Thetford.
- Whittingham MJ, Wilson JD & Donald PF 2003. Do habitat association models have any generality? Predicting skylark *Alauda arvensis* abundance in different regions of southern England. *Ecography* **26**: 521-531.
- Wilson JD, Arroyo BE & Clark SC. 1996. The diet of bird species of lowland farmland: a literature review. Department of the Environment and English Nature, London, UK.

APPENDIX 1. SPECIES LISTS

Table 23 **Plant species groupings (1=yes, 0=no).**

	Axiophyte	Bird food plant	Butterfly larval food plant		Axiophyte	Bird food plant	Butterfly larval food plant
<i>Acer campestre</i>	1	0	0	<i>Leucanthemum vulgare</i>	1	0	0
<i>Acer pseudoplatanus</i>	0	0	0	<i>Linaria vulgaris</i>	0	0	0
<i>Achillea millefolium</i>	0	0	0	<i>Lolium multiflorum</i>	0	0	0
<i>Aethusa cynapium</i>	1	0	0	<i>Lolium perenne</i>	0	0	0
<i>Agrostis capillaries</i>	0	0	1	<i>Lotus corniculatus</i>	1	0	1
<i>Agrostis gigantea</i>	0	0	1	<i>Lotus pedunculatus</i>	1	0	1
<i>Agrostis stolonifera</i>	0	0	1	<i>Luzula campestris</i>	1	0	0
<i>Ajuga reptans</i>	1	0	0	<i>Lysimachia nummularia</i>	1	0	0
<i>Alliaria petiolata</i>	1	0	1	<i>Malva moschata</i>	1	0	1
<i>Alopecurus myosuroides</i>	0	0	0	<i>Matricaria discoidea</i>	0	0	0
<i>Alopecurus pratensis</i>	0	0	0	<i>Matricaria recutita</i>	1	0	0
<i>Anagallis arvensis</i>	1	0	0	<i>Medicago lupulina</i>	0	0	0
<i>Angelica sylvestris</i>	1	0	0	<i>Medicago sativa</i>	0	0	1
<i>Anisantha sterilis</i>	0	0	0	<i>Mentha aquatica</i>	1	0	0
<i>Anthriscus sylvestris</i>	0	0	0	<i>Mentha arvensis</i>	1	0	0
<i>Apium nodiflorum</i>	0	0	0	<i>Mercurialis annua</i>	0	0	0
<i>Arctium minus</i>	0	1	0	<i>Myosotis arvensis</i>	0	1	0
<i>Arrhenatherum elatius</i>	0	0	0	<i>Myosoton aquaticum</i>	1	0	0
<i>Artemisia vulgaris</i>	1	1	0	<i>Onobrychis viciifolia</i>	1	0	0
<i>Arum maculatum</i>	1	0	0	<i>Orobancha minor</i>	1	0	0
<i>Atriplex patula</i>	0	0	0	<i>Papaver rhoeas</i>	0	0	0
<i>Atriplex prostrata</i>	1	0	0	<i>Persicaria hydropiper</i>	0	0	0
<i>Avena fatua</i>	0	0	0	<i>Persicaria lapathifolia</i>	0	0	0
<i>Brachypodium sylvaticum</i>	1	0	1	<i>Persicaria maculosa</i>	0	0	0
<i>Brassica napus</i>	0	0	0	<i>Phacelia tanacetifolia</i>	0	0	0
<i>Bromus hordeaceus</i>	0	0	0	<i>Phalaris arundinacea</i>	1	0	0
<i>Bromus racemosus</i>	1	0	0	<i>Phleum bertolonii</i>	1	0	0
<i>Calystegia sepium</i>	0	0	0	<i>Phleum pratense</i>	0	0	0
<i>Capsella bursa-pastoris</i>	0	1	0	<i>Phragmites australis</i>	1	0	0
<i>Carduus acanthoides</i>	0	0	0	<i>Picris echinoides</i>	0	0	0
<i>Carex hirta</i>	0	0	0	<i>Picris hieracioides</i>	1	0	0
<i>Carex seedling sp.</i>	0	0	0	<i>Plantago lanceolata</i>	0	0	0
<i>Centaurea nigra</i>	1	1	0	<i>Plantago major</i>	0	0	0
<i>Cerastium fontanum</i>	0	1	0	<i>Poa angustifolia</i>	1	1	1
<i>Chaerophyllum temulum</i>	1	0	0	<i>Poa annua</i>	0	1	1
<i>Chenopodium album</i>	0	0	0	<i>Poa humilis</i>	1	0	0
<i>Chenopodium bonus-henricus</i>	0	0	0	<i>Poa trivialis</i>	0	1	1
<i>Cirsium arvense</i>	0	1	0	<i>Polygala vulgaris</i>	1	0	0
<i>Cirsium vulgare</i>	0	1	0	<i>Polygonum aviculare agg.</i>	0	1	0
<i>Clematis vitalba</i>	0	0	0	<i>Potentilla reptans</i>	0	0	1
<i>Conium maculatum</i>	0	0	0	<i>Prunella vulgaris</i>	0	0	0
<i>Convolvulus arvensis</i>	1	1	0	<i>Prunus spinosa</i>	0	0	0
<i>Cornus sanguinea</i>	1	1	0	<i>Pulicaria dysenterica</i>	1	0	0
<i>Crataegus monogyna</i>	0	0	0	<i>Quercus robur</i>	0	0	0
<i>Crepis capillaris</i>	0	1	0	<i>Quercus seedling sp.</i>	0	0	0
<i>Cynosurus cristatus</i>	0	0	1	<i>Ranunculus bulbosus</i>	1	1	0
<i>Dactylis glomerata</i>	0	1	1	<i>Ranunculus repens</i>	0	1	0
<i>Daucus carota</i>	1	0	0	<i>Rubus fruticosus agg.</i>	0	1	0
<i>Dipsacus fullonum</i>	0	1	0	<i>Rumex acetosa</i>	0	1	1
<i>Eleocharis palustris</i>	1	0	0	<i>Rumex conglomeratus</i>	0	0	0
<i>Elytrigia repens</i>	0	1	1	<i>Rumex obtusifolius</i>	0	1	0
<i>Epilobium ciliatum</i>	0	0	0	<i>Salix caprea</i>	0	0	0
<i>Epilobium hirsutum</i>	0	0	0	<i>Sambucus nigra</i>	0	0	0
<i>Epilobium parviflorum</i>	1	0	0	<i>Senecio erucifolius</i>	1	1	0
	Axiophyte	Bird	Butterfly		Axiophyte	Bird	Butterfly

		food plant	larval food plant			food plant	larval food plant
<i>Epilobium sp.</i>	0	0	0	<i>Senecio jacobaea</i>	0	1	0
<i>Epilobium tetragonum</i>	1	0	0	<i>Senecio vulgaris</i>	0	1	0
<i>Equisetum arvense</i>	0	0	0	<i>Sherardia arvensis</i>	1	0	0
<i>Equisetum palustre</i>	1	0	0	<i>Silene dioica</i>	0	0	0
<i>Euphorbia exigua</i>	1	0	0	<i>Silene latifolia</i>	0	0	0
<i>Euphorbia peplus</i>	1	0	0	<i>Sinapis arvensis</i>	0	1	0
<i>Fallopia convolvulus</i>	0	0	0	<i>Solanum dulcamara</i>	1	0	0
<i>Festuca arundinacea</i>	0	1	0	<i>Solanum nigrum</i>	0	0	0
<i>Festuca pratensis</i>	0	1	1	<i>Sonchus arvensis</i>	0	1	0
<i>Festuca rubra agg.</i>	0	1	1	<i>Sonchus asper</i>	0	1	0
<i>Fraxinus excelsior</i>	0	0	0	<i>Sonchus oleraceus</i>	0	1	0
<i>Galega officinalis</i>	0	0	0	<i>Stachys sylvatica</i>	0	0	0
<i>Galeopsis tetrahit agg.</i>	0	1	0	<i>Stellaria media</i>	0	1	0
<i>Galium aparine</i>	0	0	0	<i>Stellaria uliginosa</i>	1	0	0
<i>Galium mollugo</i>	1	0	0	<i>Symphytum officinale</i>	1	0	0
<i>Geranium dissectum</i>	0	0	0	<i>Taraxacum officinale</i>	0	0	0
<i>Geranium molle</i>	0	0	0	<i>Torilia japonica</i>	1	0	0
<i>Geranium robertianum</i>	0	0	0	<i>Tragopogon pratensis</i>	1	0	0
<i>Geum urbanum</i>	1	1	0	<i>Trifolium dubium</i>	0	1	0
<i>Glechoma hederacea</i>	0	0	0	<i>Trifolium hybridum</i>	0	0	0
<i>Glyceria maxima</i>	0	0	0	<i>Trifolium pratense</i>	0	1	0
<i>Hedera helix</i>	0	0	0	<i>Trifolium repens</i>	0	1	0
<i>Heracleum sphondylium</i>	0	0	0	<i>Tripleurospermum inodorum</i>	0	0	0
<i>Holcus lanatus</i>	0	1	1	<i>Trisetum flavescens</i>	1	0	0
<i>Holcus mollis</i>	1	1	0	<i>Triticum aestivum</i>	0	0	0
<i>Hypericum hirsutum</i>	1	0	0	<i>Urtica dioica</i>	0	1	1
<i>Impatiens glandulifera</i>	0	0	1	<i>Verbascum thapsus</i>	1	0	0
<i>Juncus effusus</i>	0	0	0	<i>Veronica arvensis</i>	0	0	0
<i>Juncus inflexus</i>	0	0	0	<i>Veronica chamaedrys</i>	0	0	0
<i>Lactuca serriola</i>	0	0	0	<i>Veronica persica</i>	0	0	0
<i>Lamium album</i>	0	1	0	<i>Vicia cracca</i>	1	1	1
<i>Lamium purpureum</i>	0	1	0	<i>Vicia hirsuta</i>	1	0	0
<i>Lapsana communis</i>	0	0	0	<i>Vicia sativa</i>	1	1	0
<i>Lathyrus nissolia</i>	1	0	0	<i>Vicia tetrasperma</i>	1	1	0
<i>Lathyrus pratensis</i>	1	0	1	<i>Viola arvensis</i>	0	0	0
<i>Leontodon autumnalis</i>	0	1	0				

Table 24 Butterfly species for which presence of larval food plants was analysed

English name	Latin name
Comma	<i>Polygonia c-album</i>
Common Blue	<i>Polyommatus icarus</i>
Dingy Skipper	<i>Erynnis tages</i>
Essex Skipper	<i>Thymelicus lineola</i>
Gatekeeper	<i>Pyronia tithonus</i>
Green Hairstreak	<i>Callophrys rubi</i>
Grizzled Skipper	<i>Pyrgus malvae</i>
Large Skipper	<i>Ochlodes venata</i>
Marbled White	<i>Melanargia galathea</i>
Meadow Brown	<i>Maniola jurtina</i>
Orange-tip	<i>Anthocharis cardamines</i>
Peacock	<i>Inachis io</i>
Ringlet	<i>Aphantopus hyperantus</i>
Small Copper	<i>Lycaena phlaeas</i>
Small Heath	<i>Coenonympha pamphilus</i>
Small Skipper	<i>Thymelicus sylvestris</i>
Small Tortoiseshell	<i>Aglais urticae</i>
Speckled Wood	<i>Pararge aegeria</i>
Wall	<i>Lasiommata megera</i>
Wood White	<i>Leptidea sinapsis</i>

Table 25 Bird species for which presence of food plants was analysed

English name	Latin name
Chaffinch	<i>Fringilla coelebs</i>
Collared Dove	<i>Streptopelia decaocto</i>
Corn Bunting	<i>Miliaria calandra</i>
Goldfinch	<i>Carduelis carduelis</i>
Greenfinch	<i>Carduelis chloris</i>
Grey Partridge	<i>Perdix perdix</i>
House sparrow	<i>Passer domesticus</i>
Linnet	<i>Carduelis cannabina</i>
Reed Bunting	<i>Emberiza schoeniclus</i>
Skylark	<i>Alauda arvensis</i>
Stock Dove	<i>Columba oenas</i>
Tree Sparrow	<i>Passer montanus</i>
Woodpigeon	<i>Columba palumbus</i>
Yellowhammer	<i>Emberiza citrinella</i>

Table 26 **Species recorded in summer botanical assessments**

Species	% frequency	% mean abundance when present	% top cover
<i>Cirsium arvense</i>	66.39	25.54	3.24
<i>Dactylis glomerata</i>	52.46	42.95	7.91
<i>Holcus lanatus</i>	52.46	33.36	4.29
<i>Arrhenatherum elatius</i>	50.82	39.23	6.23
<i>Festuca rubra</i> agg	49.18	47.64	6.80
<i>Lolium perenne</i>	44.26	40.89	6.27
<i>Elytrigia repens</i>	40.98	27.10	2.34
<i>Poa trivialis</i>	36.89	28.40	0.53
<i>Trifolium repens</i>	36.07	44.93	5.41
<i>Urtica dioica</i>	36.07	25.00	0.04
<i>Phleum pratense</i>	33.61	42.56	2.99
<i>Galium aparine</i>	33.61	19.88	0.90
<i>Ranunculus repens</i>	32.79	22.63	1.19
<i>Taraxacum officinale</i>	31.97	22.10	0.57
<i>Sonchus asper</i>	31.15	19.60	0.04
<i>Agrostis stolonifera</i>	30.33	28.44	1.88
<i>Heracleum sphondylium</i>	27.87	22.31	0.66
<i>Anisantha sterilis</i>	24.59	19.83	0.37
<i>Rumex obtusifolius</i>	22.95	9.99	0.45
<i>Senecio jacobaea</i>	22.95	10.71	0.08
<i>Poa annua</i>	21.31	23.64	0.25
<i>Trifolium pratense</i>	20.49	48.20	0.49
<i>Lotus corniculatus</i>	19.67	45.83	1.68
<i>Alopecurus myosuroides</i>	18.85	25.43	0.66
<i>Cirsium vulgare</i>	18.85	9.13	0.41
<i>Veronica persica</i>	18.03	19.09	0.00
<i>Rubus fruticosus</i> agg	17.21	17.38	0.57
<i>Convolvulus arvensis</i>	16.39	17.50	0.29
<i>Picris echioides</i>	15.57	13.68	0.33
<i>Medicago lupulina</i>	15.57	26.05	0.29
<i>Bromus hordeaceus</i>	15.57	15.26	0.20
<i>Agrostis capillaris</i>	14.75	17.78	0.49
<i>Plantago major</i>	14.75	15.83	0.12
<i>Fraxinus excelsior</i>	14.75	14.72	0.12
<i>Anagalis arvensis</i>	13.93	22.94	0.41
<i>Epilobium hirsutum</i>	13.93	10.00	0.20
<i>Viola arvensis</i>	13.93	23.53	0.00
<i>Polygonum aviculare</i> agg	13.11	17.81	0.78
<i>Tripleurospermum inodorum</i>	12.30	28.00	2.94
<i>Plantago lanceolata</i>	12.30	22.00	0.37
<i>Triticum aestivum</i>	12.30	33.00	0.00
<i>Senecio vulgaris</i>	11.48	18.21	0.20
<i>Anthriscus sylvestris</i>	11.48	10.00	0.04
<i>Atriplex patula</i>	10.66	27.31	0.82
<i>Capsella bursa-pastoris</i>	10.66	19.62	0.33
<i>Glechoma hederacea</i>	10.66	13.85	0.04
<i>Stellaria media</i>	10.66	20.38	0.00
<i>Cerastium fontanum</i>	10.66	12.66	0.00
<i>Centaurea nigra</i>	9.84	17.92	0.53
<i>Prunus spinosa</i>	9.84	13.75	0.16
<i>Geranium dissectum</i>	9.84	8.33	0.00

Species	% frequency	% mean abundance when present	% top cover
<i>Fallopia convolvulus</i>	9.02	45.00	1.27
<i>Chenopodium album</i>	9.02	52.27	0.98
<i>Equisetum arvense</i>	9.02	14.55	0.04
<i>Sonchus arvensis</i>	9.02	13.64	0.00
<i>Geranium molle</i>	9.02	11.82	0.00
<i>Prunella vulgaris</i>	9.02	9.09	0.00
<i>Calystegia sepium</i>	8.20	31.50	0.49
<i>Onobrychis viciifolia</i>	8.20	31.00	0.29
<i>Myosotis arvensis</i>	8.20	11.50	0.08
<i>Persicaria maculosa</i>	7.38	26.67	0.45
<i>Holcus mollis</i>	7.38	23.89	0.41
<i>Festuca pratensis</i>	7.38	35.00	0.16
<i>Cynosurus cristatus</i>	7.38	17.22	0.16
<i>Achillea millefolium</i>	7.38	15.00	0.16
<i>Hypochaeris radicata</i>	7.38	8.86	0.04
<i>Vicia hirsuta</i>	7.38	12.78	0.00
<i>Sonchus oleraceus</i>	6.56	8.75	0.53
<i>Aethusa cynapium</i>	6.56	34.38	0.53
<i>Festuca arundinacea</i>	6.56	25.00	0.37
<i>Lamium album</i>	6.56	12.50	0.12
<i>Epilobium ciliatum</i>	6.56	6.88	0.08
<i>Stachys sylvatica</i>	6.56	7.50	0.00
<i>Lamium purpureum</i>	5.74	25.71	0.20
<i>Arctium minus</i>	5.74	9.29	0.12
<i>Epilobium</i> spp.	5.74	13.57	0.04
<i>Clematis vitalba</i>	5.74	9.29	0.04
<i>Trifolium dubium</i>	5.74	14.29	0.00
<i>Hedera helix</i>	5.74	9.29	0.00
<i>Geum urbanum</i>	5.74	9.29	0.00
<i>Silene latifolia</i>	5.74	7.86	0.00
<i>Brassica napus</i>	4.92	39.17	0.37
<i>Crataegus monogyna</i>	4.92	14.17	0.12
<i>Leucanthemum vulgare</i>	4.92	38.33	0.08
<i>Sinapis arvensis</i>	4.92	42.50	0.00
<i>Vicia sativa</i>	4.92	23.33	0.00
<i>Bromus racemosus</i>	4.92	9.17	0.00
<i>Phacelia tanacetifolia</i>	4.10	47.00	0.49
<i>Papaver rhoeas</i>	4.10	25.00	0.08
<i>Persicaria lapathifolia</i>	4.10	24.00	0.08
<i>Matricaria discoidea</i>	4.10	17.00	0.08
<i>Matricaria recutita</i>	4.10	15.00	0.08
<i>Phleum bertolonii</i>	4.10	31.00	0.04
<i>Rumex acetosa</i>	4.10	30.00	0.04
<i>Sherardia arvensis</i>	4.10	13.00	0.04
<i>Veronica arvensis</i>	4.10	11.00	0.00
<i>Tragopogon pratensis</i>	4.10	9.00	0.00
<i>Agrostis gigantea</i>	4.10	7.00	0.00
<i>Lapsana communis</i>	4.10	5.00	0.00
<i>Solanum nigrum</i>	4.10	5.00	0.00
<i>Avena fatua</i>	3.28	20.00	0.25
<i>Brachypodium sylvaticum</i>	3.28	13.75	0.08
<i>Carex seedling</i> sp.	3.28	13.75	0.08
<i>Phalaris arundinacea</i>	3.28	11.25	0.08
<i>Juncus effusus</i>	3.28	10.00	0.08
<i>Daucus carota</i>	3.28	10.00	0.04

Species	% frequency	% mean abundance when present	% top cover
<i>Pulicaria dysenterica</i>	3.28	6.25	0.04
<i>Trifolium hybridum</i>	3.28	45.00	0.00
<i>Hypericum hirsutum</i>	3.28	11.25	0.00
<i>Artemisia vulgaris</i>	3.28	10.00	0.00
<i>Rumex conglomeratus</i>	3.28	6.25	0.00
<i>Epilobium parviflorum</i>	3.28	5.00	0.00
<i>Picris hieracioides</i>	2.46	35.00	0.25
<i>Vicia cracca</i>	2.46	10.00	0.12
<i>Lathyrus pratensis</i>	2.46	23.33	0.04
<i>Angelica sylvestris</i>	2.46	9.92	0.04
<i>Poa angustifolia</i>	2.46	38.33	0.00
<i>Veronica chamaedrys</i>	2.46	18.33	0.00
<i>Euphorbia exigua</i>	2.46	10.00	0.00
<i>Acer campestre</i>	2.46	6.67	0.00
<i>Chaerophyllum temulum</i>	2.46	6.67	0.00
<i>Cornus sanguinea</i>	2.46	6.67	0.00
<i>Leontodon autumnalis</i>	2.46	5.00	0.00
<i>Quercus robur</i>	2.46	5.00	0.00
<i>Symphytum officinale</i>	2.46	5.00	0.00
<i>Trisetum florescens</i>	1.64	7.50	1.07
<i>Solanum dulcamara</i>	1.64	10.00	0.70
<i>Mercurialis annua</i>	1.64	40.00	0.37
<i>Impatiens glandulifera</i>	1.64	12.50	0.20
<i>Persicaria hydropiper</i>	1.64	45.00	0.16
<i>Vicia tetrasperma</i>	1.64	20.00	0.12
<i>Galium mollugo</i>	1.64	15.00	0.08
<i>Linaria vulgaris</i>	1.64	10.00	0.08
<i>Lolium multiflorum</i>	1.64	70.00	0.04
<i>Crepis capillaris</i>	1.64	22.50	0.04
<i>Phragmites australis</i>	1.64	17.50	0.04
<i>Myosoton aquaticum</i>	1.64	10.00	0.04
<i>Stellaria alsine</i>	1.64	10.00	0.04
<i>Dipsacus fullonum</i>	1.64	5.00	0.04
<i>Poa humilis</i>	1.64	20.00	0.00
<i>Potentilla reptans</i>	1.64	17.50	0.00
<i>Geranium robertianum</i>	1.64	12.50	0.00
<i>Senecio erucifolius</i>	1.64	12.50	0.00
<i>Lotus pedunculatus</i>	1.64	10.00	0.00
<i>Lactuca serriola</i>	1.64	7.50	0.00
<i>Torilis japonica</i>	1.64	7.50	0.00
<i>Alopecurus pratensis</i>	1.64	5.00	0.00
<i>Carex hirta</i>	1.64	5.00	0.00
<i>Juncus inflexus</i>	1.64	5.00	0.00
<i>Quercus seedling</i>	1.64	5.00	0.00
<i>Verbascum thapsus</i>	0.82	5.00	2.01
<i>Galega officinalis</i>	0.82	40.00	0.29
<i>Luzula campestris</i>	0.82	50.00	0.16
<i>Glyceria maxima</i>	0.82	15.00	0.08
<i>Carduus acanthoides</i>	0.82	15.00	0.04
<i>Ajuga reptans</i>	0.82	10.00	0.04
<i>Alliaria petiolata</i>	0.82	5.00	0.04
<i>Chenopodium bonus-</i> <i>henricus</i>	0.82	5.00	0.04
<i>Eleocharis palustris</i>	0.82	5.00	0.04
<i>Conium maculatum</i>	0.82	15.00	0.00

Species	% frequency	% mean abundance when present	% top cover
<i>Sambucus nigra</i>	0.82	15.00	0.00
<i>Equisetum palustre</i>	0.82	10.00	0.00
<i>Mentha aquatica</i>	0.82	10.00	0.00
<i>Acer pseudoplatanus</i>	0.82	5.00	0.00
<i>Apium nodiflorum</i>	0.82	5.00	0.00
<i>Arum maculatum</i>	0.82	5.00	0.00
<i>Atriplex prostrata</i>	0.82	5.00	0.00
<i>Epilobium tetragonum</i>	0.82	5.00	0.00
<i>Euphorbia peplus</i>	0.82	5.00	0.00
<i>Galeopsis tetrahit agg</i>	0.82	5.00	0.00
<i>Lathyrus nissolia</i>	0.82	5.00	0.00
<i>Lysimachia nummularia</i>	0.82	5.00	0.00
<i>Malva moschata</i>	0.82	5.00	0.00
<i>Medicago sativa</i>	0.82	5.00	0.00
<i>Mentha arvensis</i>	0.82	5.00	0.00
<i>Orobanche minor</i>	0.82	5.00	0.00
<i>Polygala vulgaris</i>	0.82	5.00	0.00
<i>Ranunculus bulbosus</i>	0.82	5.00	0.00
<i>Salix caprea</i>	0.82	5.00	0.00
<i>Silene dioica</i>	0.82	5.00	0.00

APPENDIX 2. ATTRIBUTES CONTRIBUTING TO SCORES AND CRITERIA FOR SCORING

If criterion achieved, score = 1, otherwise score = 0). Criteria highlighted in yellow result in a score of zero if not complied with.

Table 27 Key attributes for farmland bird options to be assessed in field (normal text) or by interview (italics). Criteria highlighted in yellow result in a score of zero if not complied with

Option	Location		Condition	
	Attribute	Criteria	Attribute	Criteria
In-field nesting				
C3a Reverted arable areas (will also provide foraging habitat) ¹	Area	>2ha	Pernicious weeds ²	Low level (<10% cover)
	Location in field	Whole or part field, not boundary strip	Bare ground	10% or more cover
	% field boundary composed of woodland or tree lines	Max 10%	Vegetation height	20% or more of area 10cm high or less (including bare ground)
			Desirable plant spp ³	5% or more cover
			Forb cover (inc annual 'weeds')	10% or more cover
			<i>Long term or rotational?</i>	<i>Rotational – relocated at least every 3 years</i>
C4 Skylark plots	Crop	Winter cereal	Deliberately created? ⁴	Yes
	Field size	>5ha	Density	Min 2/ha
	Distance from field boundary	At least 80% > 50m from field boundary	Weed cover	>10 but <60%
	Distance from tramlines	Not touching tramlines	Width	Min 3m
			Area	Min 16m ²
			<i>Time of establishment</i>	<i>Before end December</i>

¹ Note requirements are quite different to those for other farmland wildlife, see below.

² Pernicious or undesirable weeds include creeping and spear thistle, broad-leaved and curled dock, ragwort throughout and, in arable fields, cleavers and grass weeds other than annual meadow grass.

³ Species known to be important as food plants and support invertebrates eaten by birds: Fat hen, chickweed, Polygonum spp. (knotgrass, redshank, black bindweed, pale persicaria etc.), annual meadow-grass, charlock.

⁴ Some areas claimed as 'skylark plots' are drill misses. These may still serve a similar function, but are not additional management over what would have been done anyway

Option	Location		Condition	
	Attribute	Criteria	Attribute	Criteria
C5 Fallow plots/ uncropped, cultivated areas for ground-nesting birds on arable land	Field size	>2ha	Area	Min 1ha, max 2.5ha
	% field boundary composed of woodland or tree lines	Max 10%	Width	Min 100m
	Distance from woods, trees, Adjacent habitat (same/next field)	Min 100m	Pernicious weeds	Low level (<10% cover)
		Extensively grazed grassland	Vegetation cover	<60%
			Time of cultivation	Between 1 Feb & 20 Mar
Overwinter seed				
C6 Overwinter stubbles followed by spring/summer fallow	Preceding crop	Combinable crop, not maize	Desirable plant spp ⁵	5% or more cover in stubble
	Field size	Min 2ha	Broadleaved weed cover	10% or more cover in stubble
			Evidence of seeding	Evidence of seed production
			Height of stubble	Min 30% < 10cm
			Height of stubble	Min 30% > 10cm
			Herbicide use	Not before 15 May
			Herbicide use	Not before July
C7a Overwintered Stubble	Preceding crop	Combinable crop, not maize	Pre-harvest desiccant or post- harvest herbicide?	Not applied
			Desirable plant spp ⁵	5% or more cover in stubble,
			Broadleaved weed cover	10% or more cover in stubble
			Evidence of seeding	Evidence of seed production
			Height of stubble	Min 30% < 10cm
			Height of stubble	Min 30% > 10cm
			Pre-harvest desiccant or post- harvest herbicide?	Not applied

⁵ Fat hen, chickweed, Polygonum spp. (knotgrass redshank, black bindweed etc.), annual meadow-grass, charlock

Option	Location		Condition	
	Attribute	Criteria	Attribute	Criteria
C9 Wild bird seed mixture	Location in field	At field edge	Crop types	As listed in CFE guide. No maize or giant sorghum
			No. crop types	Min 3 (excluding maize & giant sorghum)
			Area	Min 0.4ha,
			Width	Min 6m
			%cover sown crops	>70% late summer/ autumn
			%cover sown crops	>50% late summer/ autumn
			Seed production	>80% sown crop plants ground cover is of crop plants that are flowering/ seeding
			Seed production	>40% ground cover is of crop plants that are flowering/ seeding
			<i>Intended time of destruction</i>	<i>After 1 March</i>
C10 Game strips	Location in field	At field edge	Crop types	Seed bearing crops No maize or giant sorghum
			No. crop types	Min 3 (excluding maize and giant sorghum)
			Area	Min 0.4ha,
			Width	Min 6m
			%cover sown crops	70% or more late summer/ autumn
			%cover sown crops	>50% late summer/ autumn
			Seed production	80% or more sown crop plants ground cover is of crop plants that are flowering/ seeding
			Seed production	>40% ground cover is of crop plants that are flowering/ seeding
			<i>Intended time of destruction</i>	<i>After 14 February</i>

Option	Location		Condition	
	Attribute	Criteria	Attribute	Criteria
Insect-rich foraging habitats				
C8 Uncropped cultivated margins	Location in field	At field edge	Width	Min 3m
			Pernicious weeds	<20% cover (summer)
			Desirable plant spp ⁶	10% or more cover
			Broadleaved weed cover	20% or more cover
			Height of vegetation	20% or more below 10cm
			% bare ground	10% or more bare ground
			Timing of cultivation	Varied (spring/autumn in different years)
			Depth of cultivation	Deliberately varied
C11 Unharvested cereal headlands	Location in field	Edge of cereal field	Width	Min 3m
	Adjacent habitat	buffer strip, stubble, wild bird seed mix, nectar mix	Desirable plant spp ⁷	5% or more cover (summer)
			Undesirable weeds	<10% cover (summer)
			Broadleaved weed cover	10% or more cover (<2% =zero score)
			Insecticide use	None after 15 March
			Herbicide	Only permitted herbicides
			Herbicide	No broadleaved herbicide
			Fertiliser/manures	None
C14 Selective use of spring herbicides (NB no examples of this measure have been recorded to date)	Location	Cereal crop (not maize)		
			Desirable plant spp ⁸	5% or more cover (summer)
	Soil type	sandy, shallow, chalky, stony	Undesirable weeds	<10% cover (summer)
			Broadleaved weed cover	10% or more cover (<2% =zero score)
			Insecticide use	None after 15 March
			Herbicide	Only permitted herbicides
			Herbicide	No broadleaved herbicide

⁶ For birds, this will include those spp known to be important as food plants and support invertebrates eaten by birds (Fat hen, chickweed, Polygonum spp. (knotgrass redshank, black bindweed etc.), annual meadow-grass, charlock). For arable flora, rarity and conservation value will be taken into account

⁷ Fat hen, chickweed, Polygonum spp. (knotgrass redshank, black bindweed etc.), annual meadow-grass, charlock

⁸ Fat hen, chickweed, Polygonum spp. (knotgrass redshank, black bindweed etc.), annual meadow-grass, charlock

Table 28 Key attributes for farmland wildlife options to be assessed in field (normal text) or by interview (italics)⁹

Option	Location		Condition	
	Attribute	Criteria	Attribute	Criteria
Farm wildlife: invertebrates & non-arable flora				
C3a Reverted arable areas			Width	Min 6m
			Height of vegetation	<10% below 5cm
			Height of vegetation	<20% tussocks >15cm high
			Cover ryegrasses & clover	<30%
			Cover forbs & sedges	10% or more
			Forb flower abundance	10 or more/m ²
			Undesirable weeds	<10% cover (summer)
			<i>Long term or rotational?</i>	<i>Not moved or intended to be moved</i>
			<i>Cutting</i>	<i>Not before 31 July</i>
			<i>Uncut area</i>	<i>Margin (± part of field) left uncut</i>
C3b Optional scrub management)			<i>Establishment method</i>	<i>Natural regeneration or sown with seed mix including forbs</i>
			Proportion of scrub	<50%
			Proportion of scrub	>10%
			<i>Cutting of scrub</i>	<i>Not in breeding season (March-August)</i>
			<i>Cutting of scrub</i>	<i>Cut in rotation (not all at once)</i>
			Cover ryegrasses & clover	<30%
			Cover forbs & sedges	10% or more
			Forb flower abundance	10 or more/m ²
			Undesirable weeds	<10% cover (summer)
			<i>Cutting</i>	<i>Not before 31 July</i>

⁹ Additional measures for which no examples have been recorded to date are: C12b Option for use in horticultural crops, C13 Sown wildflower headlands, and C15 Short rotation coppice.

Farm wildlife: arable flora				
C8 Uncropped cultivated margins	Location in field	At field edge	Width	Min 3m
			Pernicious weeds	<20% cover (summer)
			Desirable plant spp ¹⁰	20% or more cover (summer)
			Rare species present	Spp with scores 1-3 ¹¹
			Very rare spp. present	Spp with score 4-9
			Timing of cultivation	varied
			Depth of cultivation	varied
C11 Unharvested cereal headlands	Location in field	Edge of cereal field (not maize)	Width	Min 3m
	Adjacent habitat	buffer strip, stubble, wild bird seed mix, nectar mix	Desirable plant spp ¹¹	10% or more cover (summer) (<2% =zero score)
	Soil type	Sandy, shallow, chalky, stony	Undesirable weeds	<10% cover (summer)
			Rare or very rare species present	Any species on list ¹²
			Insecticide use	None after 15 March
			Herbicide	Only permitted herbicides
			Herbicide	No broadleaved herbicide
Farm wildlife: pollinators				
C12a Pollen & nectar mixtures	Location in field	At field edge	Width	Min 6m
			No. crop types	At least four from list ¹³
			%cover sown crops	75 % or more in summer
			Live flower abundance	30 or more per m ²
			Pernicious weeds	<10% cover (summer)
			Cutting	Yes
			Removal of cuttings	Cuttings removed or shredded

¹⁰ Broadleaved weeds other than cleavers, creeping and spear thistle, broad-leaved and curled dock, ragwort

¹¹ See 'Important Arable Plant Areas' report, Appendix II.

¹² As C11 is not targeted specifically at rare arable plants (unlike C8), occurrence of very rare species is highly unlikely so is not specified separately.

¹³ Red clover, alsike clover, birds-foot-trefoil, sainfoin, musk mallow, common knapweed

Table 29 Key attributes for resource protection options to be assessed in field (normal text) or by interview (italics)¹⁴

Option	Location		Condition	
	Attribute	Criteria	Attribute	Criteria
C1 Grass buffers alongside temporary and permanent watercourses	Location in field	Alongside watercourse	Width	Min 6m (including cross-compliance strip)
	Topography	At bottom of slope	Vegetation cover	Min 80% (winter)
	Soil type	Sandy, light silty, medium, chalk & limestone soils	Vegetation cover	Min 70% (winter)
	Slope	2-7° on medium, chalk & limestone soils; 2-11° on sandy and light silty soils	Sown/naturally regenerated	Sown
			Use for access	No tracks, ruts, compacted areas or poaching
			<i>Cutting – 3m next to watercourse</i>	<i>None or at most every 2 years</i>
			<i>Removal of cuttings</i>	<i>Cuttings removed</i>
			<i>Compaction removed?</i>	<i>Yes</i>
C2 Grass areas to prevent erosion and runoff	Location in field	Along natural drainage path (valley in field)	Width	Min 6m
	Topography	At bottom or across slope	Vegetation cover	Min 80% (winter)
	Soil type	Sandy, light silty, medium, chalk & limestone soils	Vegetation cover	Min 70% (winter)
	Slope	2-7° on medium, chalk & limestone soils; 2-11° on sandy and light silty soils	Sown/naturally regenerated	Sown
			Use for access	No tracks, ruts, compacted areas or poaching
			<i>Cutting – 3m next to crop</i>	<i>Annually, after 31 July</i>
			<i>Removal of cuttings</i>	<i>Cuttings removed</i>
			<i>Compaction removed?</i>	<i>Yes</i>
			Width	Min 6m (incl. x-compliance strip)

¹⁴ Additional measures for which no examples have been recorded to date are: C7b Options for vulnerable soil, and C13 Sown wildflower headlands.

C3a Reverted arable areas	Location in field	Alongside watercourse, across slope above watercourse or along natural drainage path (valley in field)	Vegetation cover	Min 80% (winter)
	Soil type	Sandy, light silty, medium, chalk & limestone soils	Vegetation cover	Min 70% (winter)
	slope	2-7° on medium, chalk & limestone soils; 2-11° on sandy and light silty soils	Sown/naturally regenerated	Sown
			Use for access	No tracks, ruts, compacted areas or poaching
			<i>Long term or rotational?</i>	<i>Not moved or intended to be moved</i>
			<i>Cutting</i>	<i>Not before 31 July</i>
			<i>Removal of cuttings</i>	<i>Cuttings removed</i>
			<i>Compaction removed?</i>	<i>Yes</i>
			Proportion of scrub	<50%
C3b Optional scrub management: as C3a for grassy areas but assumed to be long term. No additional requirements for scrub areas.	Location in field	Alongside watercourse, across slope above watercourse or along natural drainage path (valley in field)	Proportion of scrub	>10%
	Soil type	Sandy, light silty, medium, chalk & limestone soils	<i>Cutting of scrub</i>	<i>Cut in rotation (not all at once)</i>
	slope	2-7° on medium, chalk & limestone soils; 2-11° on sandy and light silty soils	Vegetation cover (grassy areas)	Min 80% (winter)
			Vegetation cover (grassy areas)	Min 70% (winter)
			Sown/naturally regenerated	Sown
			Use for access	No tracks, ruts, compacted areas or poaching
			<i>Compaction removed?</i>	<i>Yes</i>

APPENDIX 3 REPORT OF SPRING ASSESSMENTS, SEPTEMBER 2011

KEY MESSAGES

This report presents results from a survey of those undertaking voluntary management as part of the Campaign and those doing voluntary management not considered part of the Campaign, as defined by responses to the Defra postal questionnaire undertaken in February. However, it must be noted that only 24% of farmers that responded to the Defra survey were undertaking voluntary management as part of the Campaign and 27% had management similar to Campaign measures.

Support for the aims of the Campaign remains high, although the sample of farmers surveyed here appear to be slightly less supportive of the approach than in 2010. Nearly 20% of those contributing to the Campaign through voluntary measures expressed concerns that a small number of farmers were contributing to voluntary measures whilst the majority were doing nothing. A small number suggested that they would prefer a compulsory scheme (cross compliance or Environmental Stewardship (ES)).

Overall, there has been an increase in awareness of the aims and requirements of the Campaign over the past year. However, confusion remains amongst some about the relationship of the Campaign with ES, with a small number of those interviewed considering that participation in ES constitutes sufficient contribution to the Campaign and a wider view that the Campaign should be targeted at those farmers not in an agri-environment scheme (AES).

Some farmers consider that an ES points total in excess of their target should be considered as voluntary management. However, if this approach was to be considered, a more thorough assessment of the voluntary contribution and the balance between in field and boundary options would need to be made.

More farmers were undertaking new management in response to the Campaign than in 2010. However the number of farmers with new management or changing management in response to the Campaign remained relatively low (30% of features; Table 30). Most land identified by farmers as contributing to the Campaign voluntary measures is uncropped land that has not been cropped since before the Campaign was launched, or measures which are compatible with farm management and rotations which would have been undertaken in the absence of the Campaign.

Many of those with an AES felt that it was difficult to leave more land uncropped and issues of food security were raised by some. Voluntary measures were often uncropped land 'left over' after the ES agreement. Short term uncropped land (e.g. failed crop) was also included, but areas and measures would obviously vary between years.

Some farmers that had voluntary management are in the process of entering ES agreements which will include all or most of the uncropped land currently regarded as voluntary management. However, others had not renewed ES agreements for various reasons, but had retained the management prescribed by the options. There was no apparent difference in the quality of management between farmers with and without an agri-environment agreement or in the number of different measures each farm was implementing, however 84% of those contributing voluntary management to the Campaign also had an agri-environment agreement.

There was no clear distinction between land classed on the Defra postal questionnaire as contributing to the CFE and that which was not, although only telephone interviews were carried out to assess the management undertaken by farmers who only indicated that they had land outside the Campaign. Many of those recording voluntary management outside the Campaign simply did not recognise the management as part of the Campaign because it had been done for a number of years or was part of the usual farm rotation. Some of those with land in the Campaign, but additional land outside the Campaign, had recognised that the land outside did not meet the Campaign red box requirements. However, on these farms, land considered in the Campaign did not necessarily meet red box requirements either. Understanding of the requirements was variable between farmers and measures.

There has been no apparent change in the proportion of features being managed according to the red box requirements (49%) compared to 2010 (46%). However, in 2010 many farmers were

unfamiliar with the Campaign and features were assessed in terms of the most suitable measure as judged by field surveyors. In 2011, features were assessed against the measure that the farmer indicated. Twenty percent of the features that did not fulfil these requirements, did meet the management requirements of another measure. The proportion of farms meeting red box requirements was 42%, however only 41% of the area under voluntary measures met the requirements.

Changes to the requirements in 2011, meant that a greater proportion of features would meet current red box requirements (55% of features and 47% of area). Also, if only major failure criteria are included, an additional 6% of features would be considered as contributing to the Campaign. However it must be noted that reanalysis of features was done in relation to 2011 requirements, minor failings and against alternative measures has addressed each aspect individually rather than cumulatively. Additional proportions of features meeting red box requirements under different scenarios cannot therefore be summed.

Although responses to the Defra survey indicate that only a quarter of farmers are undertaking voluntary management as part of the Campaign, analysis of the information collected in this survey suggests that these farms are taking a significant proportion (4.7%) of arable land out of production. In addition, a significant proportion of the land under voluntary management but outside the Campaign is likely to meet red box requirements, although further work is required to assess this fully.

RECOMMENDATIONS

Although some requirements have apparently been widely discussed (e.g. date when overwintered stubble can be cultivated), few farmers are clear about most of the red box requirements of the measures. More emphasis should be placed on informing farmers about key requirements that often result in features failing red box requirements, to encourage farmers to improve the management of voluntary measures.

A significant proportion of land, similar to voluntary measures but not attributed to the Campaign, apparently does meet the red box requirements, although further work is required to confirm this. This message should be emphasised to encourage farmers to declare this land as part of the CFE in future – nearly half of those declaring land as voluntary management but not part of the Campaign apparently considered it as existing management, therefore not contributing to the Campaign targets. Similarly recent changes to the guidelines should be highlighted to increase the likelihood of land being considered part of the Campaign.

The management requirements of some measures in particular have not been well understood by farmers. More detail about appropriate management should be publicised in order to encourage farmers to both improve the management of features and to recognise if existing management meets the management requirements of voluntary measures. It is suggested that the description of C5 should be revised to indicate that the plots should not be placed at the field margin.

Analysis of Environmental Stewardship data for option uptake, points target and points total could be undertaken to ascertain how much voluntary management is being undertaken within ES. Analysis should include assessment of the proportion of points that agreements are in excess of their target and, if this is considered potentially contributing to Campaign targets, the proportion of points accounted for by in-field measures should be assessed.

Table 30 Summary of farms visited, individual areas assessed and those meeting RBR

Measure	No. of farms	Number of features present on farms visited				Number of features assessed (those meeting red box requirements are displayed in brackets)							
		For Campaign	Baseline with changed management	Baseline - no management change	Total	For Campaign		Baseline with changed management		Baseline - no management change		Total	
C1	29	5	7	78	90	5	(5)	5	(1)	43	(22)	53	(28)
C2	11	0	1	39	40	0	0	1	(0)	24	(10)	25	(10)
C3a	43	12	37	244	293	8	(6)	14	(12)	77	(54)	99	(72)
C3b	13	9	4	11	24	6	(6)	4	(4)	11	(11)	21	(21)
C4	11	15		6	21	16	(3)			1	(0)	17	(3)
C5	7	5	7	7	19	5	(0)	7	(0)	4	(0)	16	(0)
C6	16	8	1	21	30	5	(0)	1	(0)	19	(2)	25	(2)
C7a	21	5	12	37	54	-	-	-	-	-	-	-	-
C7b	0											0	
C8	5	11	0	7	18	7	(1)	0	(0)	7	(4)	14	(5)
C9	21	18	4	22	44	13	(5)	4	(0)	22	(9)	39	(14)
C10	21	6	39	82	127	4	(4)	13	(8)	32	(15)	49	(27)
C11	3	0	0	3	3	-	-	-	-	-	-	0	
C12a	17	23	1	5	29	21	(4)	1	(0)	4	(0)	26	(4)
C12b													
C13													
C14													
C15													
Total		117	113	562	792	90	(34)	50	(25)	244	(127)	361	186

6. INTRODUCTION

6.1 BACKGROUND

The Campaign for the Farmed Environment (CFE) is an industry-led scheme to offset the environmental impacts of the abolition of set-aside and is now in its second year. It has three themes: farmland birds, wider biodiversity and resource protection. The Campaign aims to mitigate the loss of set-aside through participation in ELS, uptake of more in-field ELS options, maintaining uncropped land and uptake of a range of voluntary measures.

Fifteen voluntary measures (some with variants) aim to maximise environmental benefits of uncropped and arable land (Table 31), with guidance on how they should be managed. Management guidance is split into 'essential' management requirements ('red box') and additional considerations ('green box'). The primary purpose of this work is to monitor the uptake and implementation of voluntary measures, but includes assessment of attitudes and awareness of the Campaign of those both implementing and not implementing voluntary measures. Assessment of voluntary measures involved investigation of management policy through interviews with farmers and field survey of implementation.

This report provides initial findings of the second year of assessments of farmer attitudes alongside the quality of management of voluntary measures undertaken between April and July 2011

In addition, a report on the analysis of the management quality and environmental benefits of features, based on the condition monitoring carried out throughout the year, is appended as a supplement to this report.

Table 31 List of CFE Voluntary Measures

Code	Measure	Target benefits		
		Farmland birds	Wider biodiversity	Resource protection
C1	Grass buffers alongside temporary and permanent watercourses		√	√
C2	Grass areas to prevent erosion and run-off			√
C3a	Reverted arable areas		√	√
C3b	Optional scrub management		√	√
C4	Skylark plots	√		
C5	Fallow plots for ground-nesting birds on arable land	√	√	
C6	Overwinter stubble followed by spring/summer fallow	√	√	
C7a	Overwintered stubble	√	√	
C7b	Optional measure for vulnerable soil – cover crop/green manure		√	√
C8	Uncropped cultivated margins	√	√	
C9	Wild bird seed mixture – arable/grassland areas	√		
C10	Game strips	√		
C11	GWCT unharvested cereal headlands	√	√	
C12a	Pollen & nectar mixtures for arable or grassland areas	√	√	
C12b	Optional flower mix for use with horticultural crops	√	√	
C13	Sown wildflower headlands	√	√	√
C14	Selective use of spring herbicides	√	√	
C15	Enhanced management of Short Rotation Coppice		√	

6.2 MONITORING OF VOLUNTARY MEASURES

Monitoring of voluntary measures was based on a sample of returns from the Defra postal survey of 5500 farmers with 10 ha or more of cultivated land carried out in February to assess the proportion of farmers taking action under the campaign, and the voluntary measures that they are undertaking. The survey form is appended as Annex 1.

6.2.1 The Field Monitoring Programme

The objectives of the field monitoring programme are as follows:

- To assess farmer attitudes and awareness of the Campaign, including monitoring farmer intentions for subsequent years to assess future potential of the Campaign;
- To verify that farmers have put in place the measures they claim they have,
- As far as possible, to assess the quality of the environmental management and resulting habitats and features, for measures implemented as part of the Campaign and also those that were already present in the baseline,
- To estimate the extent of delivery of environmental benefits from measures, both those already put in place and those intended, based on literature review and expert opinion.

This report presents the results of the April-July 2011 monitoring, which assessed the first three objectives. Where appropriate, results from this year's spring visits are compared with data from 2010.

7. METHODS

7.1 SELECTION OF FARMS:

Farms were selected for monitoring from among those responding to the postal questionnaire sent out by Defra in February 2011, who indicated that they would take part in further research. Throughout this report the term '**VM-CFE**' is used to describe those that indicated they were implementing voluntary measures as part of the Campaign. '**VM-other**' refers to those respondents who indicated they had uncropped land similar to voluntary measures but did not consider it to be part of the Campaign. 'VM-other' farmers were selected on a different basis from 2010, when all those that indicated they were not undertaking voluntary measures as part of the Campaign were included in the sample and referred to as Non-participants. As a consequence, data for 'VM-others' in 2011 is not directly comparable with data for 'Non-participants' in 2010. Some data for 2010 are included in this report for reference purpose only.

The reason for this difference is in the 2011 survey, farmers were asked about management practices of any areas similar to voluntary measures that they did not, for whatever reason, consider to be part of the Campaign. The change in emphasis resulted from a particular policy interest in understanding what this management involved and whether this land actually met red box requirements. In the 2010 survey, farmers were only asked about management of land in the Campaign.

The sample of 'VM-CFE' farms was selected from the 676 that responded to Defra's postal questionnaire, who were implementing voluntary measures as part of the Campaign and indicated that they would be willing to be contacted about further survey work. Around a third of respondents declined to be contacted further. A sample of 100 farms was selected, of which 50% were selected at random and 50% targeted to include less common measures. The same number of reserve farms was selected. Targeted farms were selected at random from those entering each of the less common, however measures C7b C12b, C13, C14 and C15 were excluded because returns from the postal survey indicated that only a very small proportion of farms were implementing these measures, therefore sample size, even of a targeted sample, would be insufficient to make robust assessments of these measures. Measures with intermediate levels of uptake (C11, C8, C5, C6, C12a, C4, C3b, C2) were included in the sample until a target of twelve farms was reached for each, although difficulties in contacting farmers and differences between

measures implemented on farms and those declared in the Defra postal questionnaire meant that the minimum number of farms was not always achieved.

A total of 104 farms were visited between April and June, however seven of these farms were not considered to be undertaking voluntary measures when interviewed. This discrepancy was due to measures having recently entered or already been in ES and because measures were on grassland, therefore not relevant to the Campaign. On these farms, measures were not assessed in the field, however the farmer was interviewed about their attitudes to the Campaign and these responses have been included in the analysis.

The sample of 'VM-other' farms was selected at random from the 641 responses to the Defra questionnaire which indicated that they were not undertaking voluntary measures as part of the Campaign, but had uncropped land similar to Campaign measures and who indicated that they would be willing to be contacted about further survey work. Around a third of respondents declined to be contacted further. These farmers were selected in order to establish, as far as possible, what proportion of land recorded as outside the Campaign actually fulfils the red box requirements and could therefore be considered as contributing to the Campaign targets. These farmers were therefore questioned about the management of their uncropped land in relation to red box requirements, although without field monitoring, a full assessment could not be made. A total of 56 telephone interviews were conducted. Respondents were sent a copy of the questionnaire in advance.

7.2 ASSESSMENTS

Visit and telephone interviews assessed farmers' awareness of, and attitudes to, the Campaign plus details of participation in agri-environment schemes and advice received on implementing measures. Many of the questions allowed free text responses. Data analysis categorised these responses into groupings which are reported with some farmer quotes (presented in italics) presented to provide a better understanding of the responses.

Details of existing features and new features implemented in response to the Campaign were recorded on 'VM-CFE' farms and management of these features was assessed. Of the 97 'VM-CFE' farmers that had current voluntary measures, 25 also had land similar to Campaign measures which was not considered to be part of the Campaign. Interviews aimed to establish the reasons for this land being considered as outside the Campaign. Similarly, telephone interviews of 'VM-others' aimed to establish whether uncropped land would fulfil red box requirements. Full details of the 'VM-CFE' and 'VM-other' general questionnaires can be found in Annex 3, attached separately.

Field work was carried out to assess the extent to which measures have been correctly put in place and to assess the quality of management. In particular, measures were assessed against "red box requirements" (RBR). Measures were assessed against the requirements of the measure that the farmer considered they were implementing. This was different to assessments undertaken in 2010, where, because there was so much confusion about the Campaign immediately after it was launched, surveyors selected the appropriate voluntary measure on the basis of information provided at interview and field survey.

Timing of implementation was noted to allow distinction between baseline (i.e. measures implemented before the farmer was aware of the Campaign, or for rotational measures, those that would have been undertaken as part of the usual farm management) and subsequent delivery (i.e. measures established in response to the Campaign). Details of interview and field assessments are presented in Annex 2.

8. RESULTS

8.1 OVERVIEW AND ENGAGEMENT WITH THE CAMPAIGN

8.1.1 Participation

Most (96%) of those in the 'VM-CFE' sample did consider that they were participating in the Campaign (Table 32) (increased from 78% in 2010). VM-other farmers were less likely to consider that they were participating in the Campaign (59% vs 81% in 2010) although 11% were not sufficiently well informed to know.

Table 32 Number of farmers that considered they were participating in the Campaign.

Region	n	'VM-CFE'		N	'VM-other'	
		Participating	No response		Participating	No response
East Anglia	24	23		17	8	2
South	31	31		13	7	2
Midlands	18	18		11	7	1
Yorkshire	15	14		7	5	1
Non-target	16	14	1	8	6	0
Total	104	100 (96%)	1	56	33 (59%)	6

Of those that indicated how they were participating in the Campaign, 66% of VM-CFE farmers and 25% of VM-other farmers were undertaking voluntary measures, although they were not always described in these terms. Most of the VM-other and more than half of the VM-CFE farmers were participating through agri-environment agreements. Two VM-other farmers cited management in excess of ES requirements and three VM-CFE farmers mentioned other uncropped land. Overall, eight farmers mentioned voluntary management of features that would not contribute to the CFE such as woodland and hedges. Other comments were usually more general, focusing on environmentally responsible farming practice and the benefits of organic and mixed farming systems.

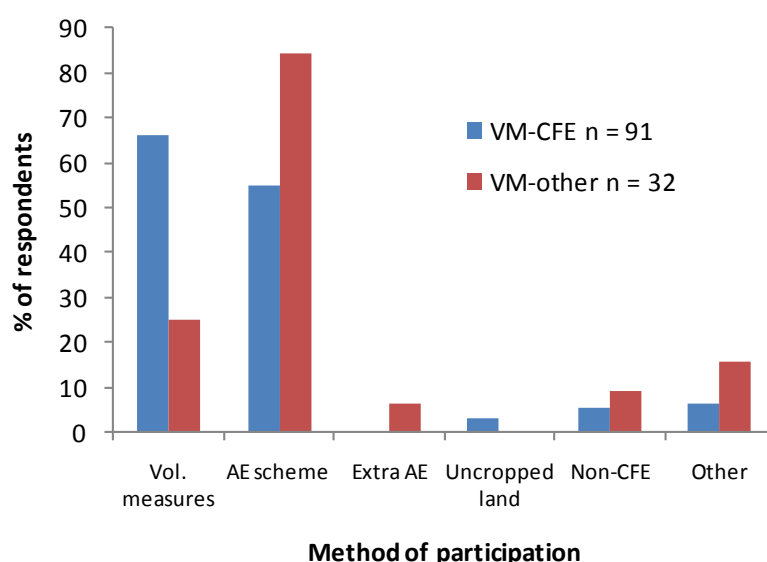


Figure 18 Methods of participation for those who considered that they were participating in the CFE.

A total of 38 'VM-other' farmers (68%) were not intending to implement voluntary measures, citing a range of reasons. Of the 34 that gave reasons, 32% were already managing areas for the

environment (but did not want a formal scheme), 21% considered their agri-environment agreement to be sufficient, 15% had not considered the CFE and 15% did not know enough about it. Twelve 'VM-other' farmers (21%) were intending to implement voluntary measures, although one indicated that the management would not meet the red box requirements.

A total of 27 'VM-other' farmers commented on what would encourage them to implement some voluntary measures. One third indicated that nothing would persuade them to include voluntary measures, four were already doing measures/environmental management, three wanted a financial incentive, three wanted simpler/more flexible measures and two wanted better/more information. One farmer indicated that he would implement measures if participation was unilateral and there was one simplified scheme including ES and CFE.

8.1.2 Attitudes

Most farmers were supportive of the aims of the Campaign (Table 33). Both 'VM-CFE' and 'VM-other' farmers were less supportive of the approach, although a larger proportion of each group was undecided about the approach than about the aims. Generally, 'VM-CFE' farmers were more supportive than 'VM-other' farmers.

Comparison with data for 2010 indicated a reduction in support for (and in increase in those that did not support) the aims and approach of the Campaign in both groups over the past year. However, there was also an increase in those that were undecided and it must be remembered that 'VM-other' data are not directly comparable between years. These changes probably in part reflect the time that farmers have had to understand the Campaign; in 2010, interviews were undertaken only a few months after the Campaign launch.

Table 33 Support for the aims and approach of the Campaign (%). Undecided not shown.

	'VM-CFE'		'VM-other'	
	2011	2010	2011	2010*
Aims – Yes	92	95	70	93
Aims – No	4	0	14	0
Approach – Yes	74	88	54	87
Approach - No	10	2	23	4

* not directly comparable between years

Aspects of the Campaign that 'VM-CFE' farmers liked included the fact that it was voluntary, that it was generally a good idea [*a good way of getting an environmental message across to farmers*], the flexibility (with respect to farm management, choice of measures and interaction with ES) [*productive arable farm, not an abundance of features but can still do measures*] and led to environmental benefits. A range of other comments were made here including the value of encouraging farmers to enter ES, although one suggested that the Campaign should concentrate on this aspect. One respondent liked that fact that farmers were encouraged to do things and to see beyond cross compliance. One commented that it was suitable for large estates but not tenant farmers and others that the measures were sensible and well presented. Only three 'VM-other' farmers specified aspects of the Campaign that they liked, although 14 indicated that there was nothing that they particularly liked about the Campaign. The positive comments were the fact that it is voluntary and that it is industry led.

Table 34 Aspects of the Campaign particularly liked by 'VM-CFE' farmers.

Aspect liked	% (n=67)
--------------	----------

Voluntary	31
Generally positive	27
Flexible	16
Environmentally beneficial	10
Public relations	4
Nothing	4
Not enough information	3
Other	13

The greatest concern amongst 'VM-CFE' farmers was that, because it was not a compulsory scheme, some farmers would not contribute to the Campaign [*some people will never join in so some will be left to carry them as well*] and *'would like it to be compulsory so that every farm in the country is doing something'*. Eleven percent of those that commented considered the messages to be unclear [*Message is slightly confused with other AE schemes*] and *'Not clear enough on what area is expected'*. The same number considered it excessive if they already had an agri-environment agreement [*hard to implement if already in an AE scheme*] and thought that the Campaign should target those not in ES [*Already in ELS, HLS, CSS - "preaching to the converted", should aim towards people who aren't in schemes*]. Ten percent of 'VM-CFE' farmers considered various aspects of the Campaign inflexible, including those that thought it should give credit for 'non-arable' features such as woodlands and other environmentally beneficial management such as game feeders.

The small number of 'VM-other' farmers that made specific comments here were concerned about specific requirements, that some would do nothing, that it should target those not in agri-environment schemes and that food production was important.

Table 35 Aspects of the Campaign particularly disliked by both groups.

Aspect disliked	'VM-CFE' % (n=62)	'VM-other'* (n=12)
Some with do nothing – compulsory better	18	2
Nothing	15	0
Message/requirements unclear	11	0
Should target those not in ES	11	2
Inflexible/too specific	10	0
Potential for enforced alternative	3	0
Specific measures/requirements	2	3
Food production important	2	2
Not enough information	2	1
Other	29	5

*Only twelve farmers in this group made specific comments about aspects of the Campaign that they disliked, therefore percentages are not presented.

A very wide range of additional comments were made in relation to support for the Campaign, many of which were similar to the aspects that were liked or disliked. These responses have been grouped (Table 36). Generally, 'VM-CFE' farmers made more positive comments than 'VM-other' farmers. The Campaign was commonly supported, particularly by 'VM-CFE' farmers because it avoided compulsory/set-aside measures and about 10% of both groups made general but positive comments, usually regarding benefits to wildlife/environment but also in more general terms on the approach [*Well thought through. Give and take on both sides to be welcomed - farmers & DEFRA*].

Sixteen percent of the 'VM-CFE' group did not agree with the approach, for example because those not in ES should be targeted or because food production was important and a further 9% of this group would prefer a compulsory scheme (ES/CFE/set-aside) [*Don't believe there are many people doing it - we're better off with set-aside*]. A small number of farmers in both groups thought that the messages were unclear or that there was insufficient publicity [*It's a bit complicated, or not explained very well*] and [*not advertising as much as they ought to*]. Some, particularly 'VM-other' farmers were concerned that the Campaign was overprescriptive and wanted to retain control over environmental management [*Too many rules involved with schemes including CFE & ELS (particularly) ..want to do own thing for wildlife*].

Table 36 Additional comments regarding farmers' support for the Campaign.

Comment	'VM-CFE' % (n=69)	'VM-other'* (n=36)
To avoid compulsory measures	23	11
Don't agree with approach	16	0
Positive comments	9	11
Compulsory scheme better (CFE/ES)	9	3
Messages not clear/sufficient	9	6
Not enough information to comment	7	19
Negative comments	6	14
Too prescriptive/farmer wants to retain control	3	11
Other	22	31

8.1.3 Awareness

Farmers were asked about their awareness of the Campaign in terms of the themes, methods of participation, availability of advice and regional issues.

In order to gain some understanding of the level of awareness, 'VM-CFE' farmers were initially asked what they knew about the Campaign under the four headings (Table 37) without further prompting. Unsurprisingly, awareness was much lower overall than when prompted. This approach was not followed for 'VM-other' farmer because they had been sent a copy of the questionnaire to assist completion over the telephone.

Awareness of different aspects of the Campaign was consistently higher for 'VM-CFE' than 'VM-other' farmers (Table 37). Awareness of the three themes was generally high, although only two thirds of 'VM-other' farmers were knew about each aspect. Fewer 'VM-CFE' farmers were aware that the Campaign aimed to improve resource protection compared to providing benefits to farmland birds and wider biodiversity. At least 85% of 'VM-CFE' farmers were aware of the methods of implementation compared to only half of 'VM-other' farmers. Two thirds of 'VM-CFE' farmers (63%, n=97) were aware that the Campaign had national targets compared to 26% (n=43) of 'VM-other' farmers.

Awareness of the availability of advice and support and targeting were lower for both groups (but particularly for 'VM-other' farmers compared to knowledge of the themes and implementation. Only 22% (n=99) of 'VM-CFE' farmers and 9% (n=43) of 'VM-other' farmers knew where their nearest Beacon farm was.

Comparison of awareness of the different aspects of the Campaign between years suggests that there has been a small increase in awareness in 2011 of implementation, targets, sources of advice and regional targeting amongst 'VM-CFE' farmers (Figure 19). Knowledge of all aspects of the Campaign apparently decreased in 2011 amongst 'VM-other' farmers, however these populations are not directly comparable.

Table 37 **Percentage of farmers who were aware of different aspects of the Campaign in 2011.**

	'VM-CFE' (n = 104)		'VM-other' (n = 47)
	Volunteered	Total after prompting	Prompted
Purpose/theme			
Resource protection	22	80	62
Farmland birds	35	92	64
Farmland wildlife	35	92	64
Implementation			
ELS renewal	16	95	51
ELS in-field options	11	89	51
Uncropped land	14	90	49
Voluntary measures	27	92	51
Nutrient management	10	86	49
Advice & support			
Local liaison groups	10	52	28
Beacon farms	8	56	28
Theme leaflets	11	68	23
County coordinator	9	35	17
Targeting			
Target counties	8	37	9
Regional priorities	6	40	15

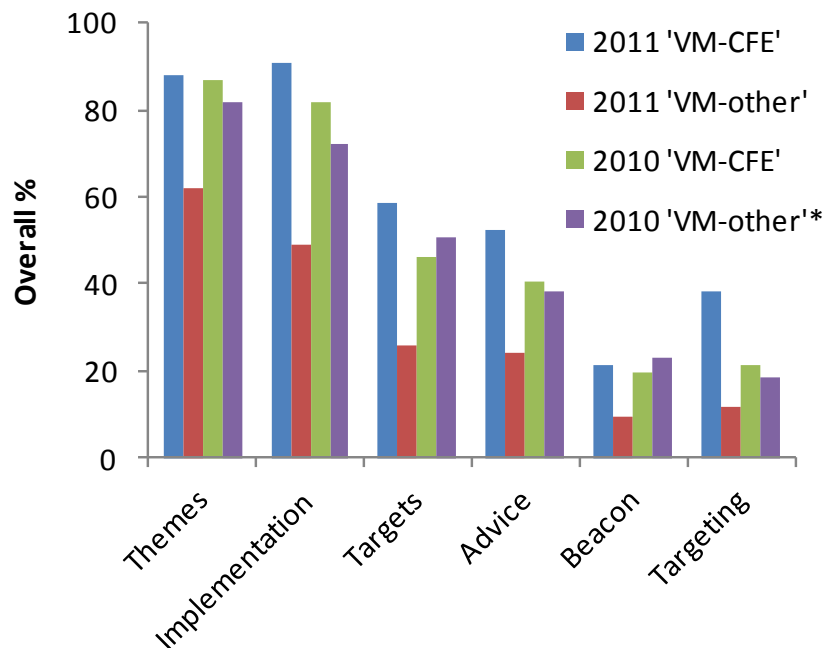


Figure 19 **Overall awareness of different aspects of the Campaign for both groups of farmers in 2011 and 2010. *not directly comparable between years.**

Of the farmers that quoted sources of information about the Campaign, most of the 'VM-CFE' farmers and around one third of the 'VM-other' group mentioned multiple sources. The CFE booklet/leaflets, the farming press and Campaign partner organisations were most commonly mentioned by both groups (Figure 20). However, 'VM-CFE' farmers were much more likely than 'VM-other' farmers, to have received information from the CFE booklet or from partner organisations. Agronomists and farm events or shows were also important for a small but significant number of both groups, but very few farmers mentioned local liaison groups or county coordinators. No, or little information had been received by 4 and 14% of 'VM-CFE' and 'VM-other' farmers respectively.

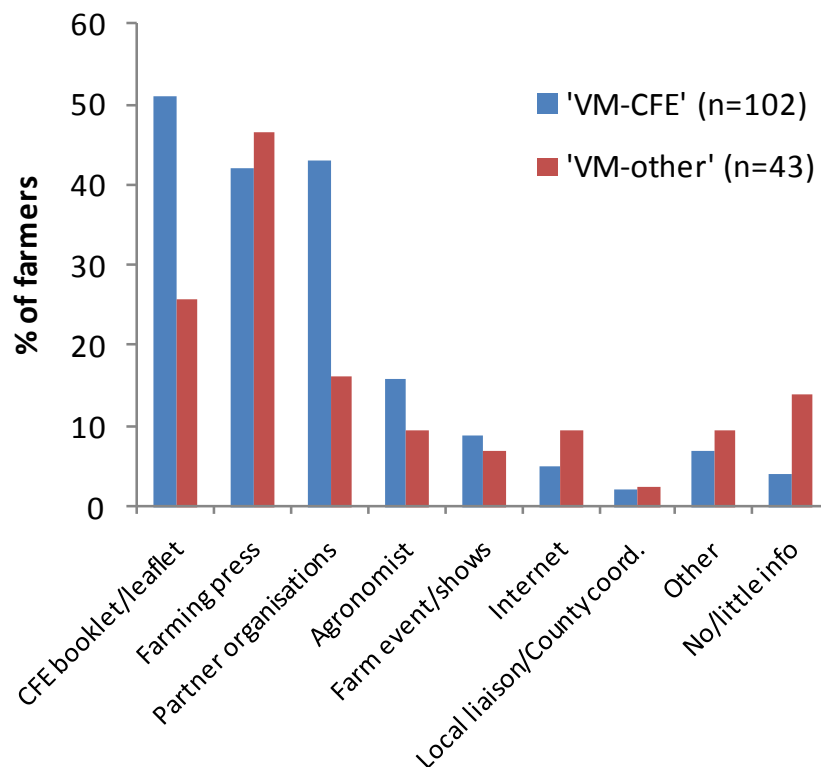


Figure 20 Sources of information for both groups of farmers.

A total of 22 'VM-CFE' farmers had received advice on choosing or implementing measures, although it was not always specific to the farm. FWAG, NE and other advisors were most commonly quoted (Figure 21). Of those that received advice, 82% felt that it met their requirements, the remainder thought that it partially met their needs.

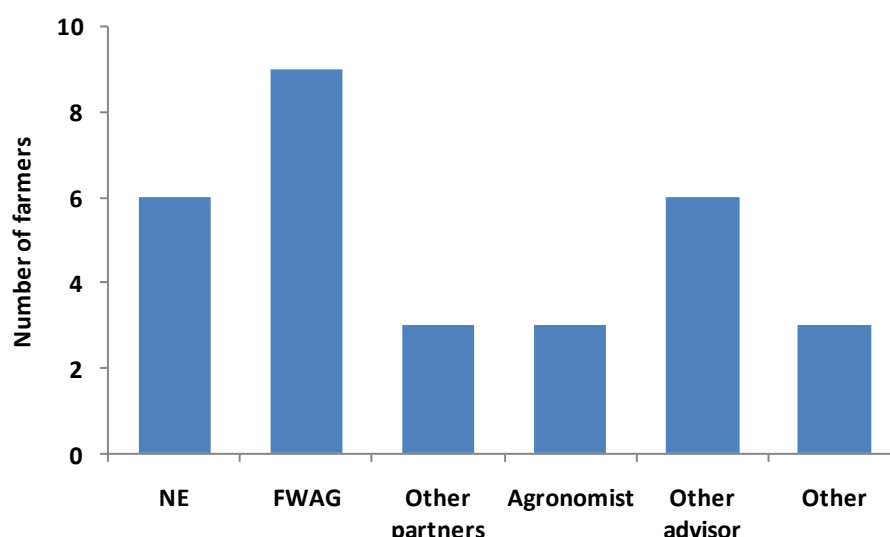


Figure 21 Sources of advice

8.1.4 Choice of measures ('VM-CFE' farms only)

Nine of the 104 'VM-CFE' farmers interviewed were found not to be currently implementing measures as part of the Campaign. This was usually because: they had misunderstood the Defra postal questionnaire and included land in ELS, they had recently entered ELS or they were grassland farms.

Similar to the previous year, the measures implemented on most farms were: C3a, C1, C7a, C9 and C10. Of the 83 farmers that gave reasons for implementing measures (Figure 22), over half wanted to benefit wildlife or the environment. One quarter wanted to support the CFE, some of whom specifically stated that their support was aimed at avoiding compulsory measures. Measures were already present (for a variety of reasons, including those that had not renewed ES agreements or had retained set-aside) on 16% of farms and measures fitted in with the farming system or ES agreement on 12% of farms. Other comments included two farmers who considered the Campaign to be positive for public relations.

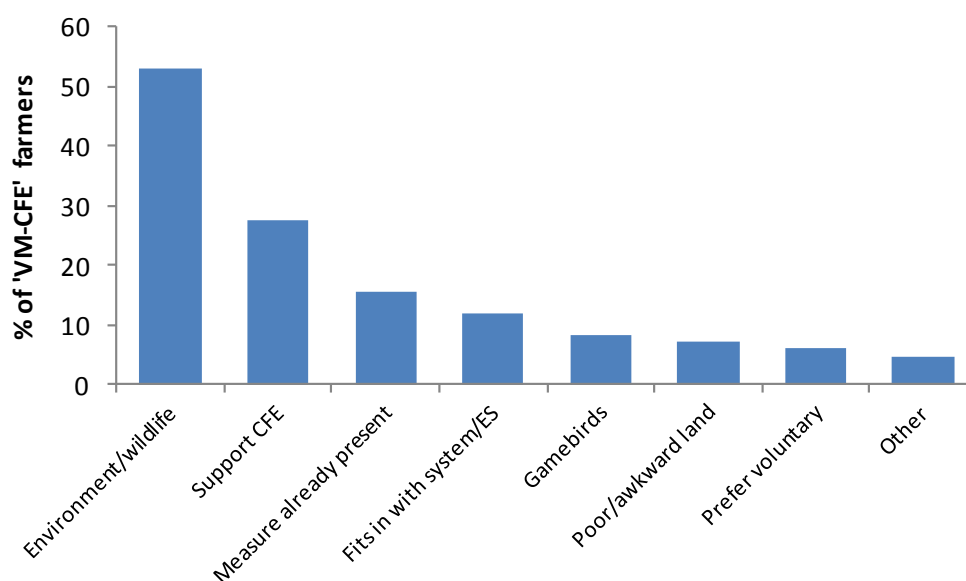


Figure 22 Reasons for 'VM-CFE' farmers implementing measures.

A total of 39% of those questioned indicated that they had other uncropped land, although not all this land was originally arable (e.g. woodland, old railway cutting). A wide range of land types/uses were recorded here, including GAEC12 land, overwinter stubble in excess of ELS agreement, land that was uncropped due to poor establishment, areas used for storage, maize for shoot, a microlight landing strip and some margins. It was often difficult to assess how these areas were managed, however from the information available up to 22% of 'VM-CFE' farmers apparently have had additional land that could be managed according to CFE red box requirements.

8.1.5 Agri-environment agreements

A total of 84% of the 'VM-CFE' and 64% of the 'VM-other' farms surveyed had an existing agri-environment scheme. Unsurprisingly, ELS was the most common scheme (Figure 23), but 19 of the 'VM-CFE' farms and 2 of the 'VM-other' farms had an HLS agreement and similar numbers were in CSS.

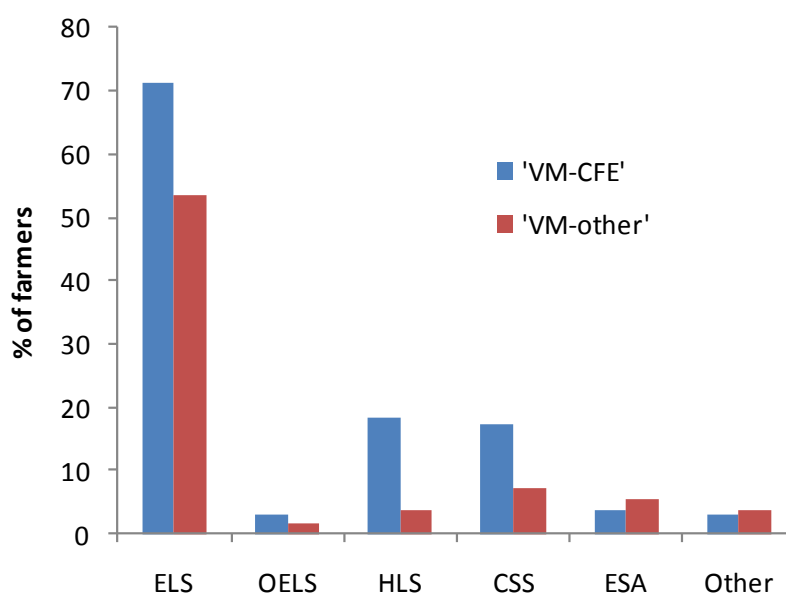


Figure 23 Agri-environment schemes.

Only 28 of the 'VM-CFE' farmers could recall sufficient detail about their ELS points target and total to allow analysis of the proportion of points in excess of their target. On average, these farms were 9.4% in excess of their points target and 13 were at least 10% in excess of their points target. Some of those from both groups that could not recall their points target and total simply indicated what percentage of points were in excess. Estimates ranged from 1 to 30%, with an average of 9.4% for 'VM-CFE' farmers and 7.5% of 'VM-other' farmers. Half of the 'VM-CFE' and one third of 'VM-other' farmers considered they were at least 10% in excess of their target. For those farmers that provided sufficient information, most farms (83%; n=52 'VM-CFE' and 66%; n=32 'VM-other') had some target 'arable' options in their ELS agreement, however, a small number of those apparently in excess of their points total had no arable options that would be considered as contributing to the CFE targets. However, it was often difficult to obtain accurate information and no details of the proportion of points contributed by arable options were recorded.

Of the 87 'VM-CFE' farmers that had an agri-environment agreement, 45 (52%) said that it had affected their choice of voluntary measures for the Campaign. Over half (53%) indicated that voluntary CFE measures simply represented uncropped land which was in excess of what was needed for their agri-environment agreement. However 27% had considered the Campaign positively in relation to their agreement and had either put in additional areas in excess of their agreement, or had chosen measures to enhance their agreement.

Of the 36 'VM-other' farmers with an agri-environment agreement, 10 indicated that their agreement affected the decision not to include any voluntary measures for the Campaign. Seven

farmers considered their contribution through their agreement to be sufficient, and two were already doing management in excess of their agreement.

A number of farmers (both 'VM-CFE' and 'VM-other') considered that, because they had an ELS points total in excess of their target, that the additional management was voluntary and should therefore contribute to the Campaign targets. This land was not assessed in this study of voluntary measures. Although some information has been collected on ES agreements, the difficulties of obtaining detailed information on points totals and option uptake mean that limited conclusions can be drawn. If excess ES management was considered by the Campaign as contributing to the voluntary targets, a thorough analysis of ES agreement data would allow assessment of genuine voluntary management being undertaken within ES agreements. This would have to take account of both the proportion of management that was above the points threshold (in effect voluntary), and the balance of uptake between arable options equivalent to CFE measures and other options such as field boundary management. For example, if a farm had 110% of its points requirement in ELS options but only 25% of the options were equivalent to CFE voluntary options, what proportion of the options could be considered to be contributing to the CFE?

8.2 IMPLEMENTATION OF MEASURES

Information on which measures farms had in place was recorded in the survey from Defra in February 2011 (Annex 1). On this form landowners were asked to record any measures that they regarded as voluntary and part of the CFE, but also in a second column they were asked to note other unpaid voluntary management that was similar to voluntary measures but which they considered outside the CFE.

During the 'VM-CFE' visits, individual measures were assessed against red box requirements through both interview questions and field surveys¹⁹. 'VM-CFE' farmers who had also recorded land as unpaid voluntary management outside the CFE were questioned as to why they considered it to be outside the Campaign. In addition, 'VM-other' farmers who had all recorded uncropped land outside the campaign were questioned as to the management of these areas in an attempt to ascertain as fully as possible whether it would meet the red box requirements, and why it was not included as part of the Campaign.

8.2.1 Accuracy of information recorded on Defra February 2011 postal survey

The comparison between the measures that were expected (based on returns of the Defra postal questionnaire) on 'VM-CFE' farms (including area) and those that were on the ground is shown in Table 38. For all measures except C3a, C12a and C15, measures were found on fewer farms than expected. Similarly, the area of each measure recorded on the Defra questionnaire was higher than the area recorded at visits (this time with the exception of C3a and C15).

It is worth noting that, although the general trend was for both numbers and areas of each measure to decrease from what was expected, in most cases there were both losses and gains for each measure. Overall only 32 land owners completed the Defra questionnaire correctly. ELS renewal was responsible for the loss of 36 measures from voluntary management, although many of these were a result of farmers entering ES subsequent to completing the questionnaire.

¹⁹ Field assessments of the participants measures were made on up to five areas, chosen at random on farm (some farms had more than 5 reps of certain measures).

Table 38 **Number of farms and area of measures expected from Defra February questionnaire compared to measures found on the ground.**

Measure	Number of farms					Area of measures ha					
	Expected	Lost	Gained	Actual	Change	Expected	Lost	Gained	Actual	Change	% Change
C1	30	9	5	26	-4	121.19	92.6	4.37	32.96	-88.23	-73
C2	14	5	2	11	-3	30.78	19.02	3.19	14.95	-15.83	-51
C3a	32	6	11	37	+5	125.66	10.71	40.78	155.73	+30.07	24
C3b	17	6	2	13	-4	24.74	7.66	2.95	20.03	-4.71	-19
C4	18	8	0	10	-8	275	51	0	224	-51	-19
C5	14	9	1	6	-8	34.63	27	2	9.63	-25	-72
C6	19	4	0	15	-4	172.32	37.79	25.1	159.63	-12.69	-7
C7a	24	4	1	21	-3	450.39	144.21	106	412.68	-38.2	-8
C7b	1	1	0	0	-1	1.15	1.15	0	0	-1.15	-100
C8	9	5	1	5	-4	15.48	11.61	2.5	6.73	-9.11	-59
C9	27	7	2	22	-5	32.19	14.06	1.14	19.27	-12.92	-40
C10	24	3	0	21	-3	118.4	5.74	0.12	122.78	-5.62	-5
C11	7	4	0	3	-4	6.73	2.95	0	3.78	-2.95	-4
C12a	14	1	3	16	+2	11.02	3	2.63	10.65	-0.37	-3
C12b	0	0	0	0	0	0	0	0	0	0	0
C13	2	1	0	1	-1	0.98	0.5	0	0.48	-0.5	-51
C14	1	0	0	1	0	50	0	0	50	0	0
C15	0	0	1	1	+1	0	0	2	2	+2	200
Mean	14	4.1	1.6	11.6	-2.5	81.7	23.8	10.7	69.2	-13.1	
% diff		-30	+11	-19			-29	+13	-16		

There was no difference in the number of voluntary measures implemented as part of the Campaign on farms with and without an agri-environment agreement (mean of 2.2 measures for both groups). The average area under voluntary measures was significantly greater for those without an AES (29.9 ha) compared to those with an AES (11.6 ha). However, these differences could be because non AES farms include a greater proportion of measures which represent large land areas and the population of non AES farms was small.

Nearly 40% of 'VM-CFE' farmers visited had also recorded land as outside the Campaign. Most of those that gave reasons for recording other land had either completed the Defra questionnaire incorrectly, or recognised that the land did not meet the red box requirements (although this did not necessarily mean that on these farms, all land under Campaign measures did meet RBR). One farmer had recorded uncropped land as outside the Campaign because he did not like the Campaign.

'VM-other' farmers were asked why the uncropped land present on the farm was not considered to be part of the Campaign when completing the Defra postal questionnaire. Of the 94 features (across 57 farms), comments were made regarding 64 (Table 39). Most commonly, farmers had not included land as part of the Campaign because there had been no change in management; uncropped areas existed already or cropped areas were part of the usual farm rotation, therefore it was assumed that these areas could not contribute to Campaign targets. In addition one fifth of features did not meet the red box requirements, and a small number did not want their land to be part of a scheme. Some farmers did consider land declared on the Defra questionnaire as outside the Campaign, to be contributing to the CFE. Others did not know enough about the Campaign to assess whether existing uncropped land could contribute.

Table 39 **Reasons why land similar to voluntary measures was not considered part of the Campaign by 'VM-other' farmers**

Reason	% (n=64)
Area already existed	41
Does not meet red box requirements	19
Not enough knowledge of CFE	17
Is part of CFE	11
Don't want it to be part of a scheme	5
Other	8

8.2.2 Compliance with red box requirements

The essential requirements to meet the Red box requirements for certain voluntary measures have changed since the initial version of '*A farmer's guide to voluntary measures*' was published'. Farmers had not received the new handbook at the time of the interviews and they were unaware of the changes to the essential requirements for measures. For this reason management of the measures, and compliance with the red box requirements was assessed against the original red box requirements. Reanalysis of features against new RBRs is presented in section 8.2.2.4.

On 'VM-CFE' farms, the proportion of individual features that met RBR is 49%. This is slightly higher than the figure in 2010, when 46% of features met RBR. The area of land that met RBR was also calculated (Table 40). Data for 'VM-other' farms is included in this table, but is discussed in section 8.2.2.5. The proportion of the total area assessed that met the RBR was, for most measures, broadly comparable with the proportion of farms or features that met the RBR, and the average of the unweighted percentages was 43. This was similar to the average percentage area complying, calculated as a ratio of totals (i.e. weighted by amount per measure, as for the other metrics) at 41%. The presence of an Agri-environment scheme on a farm did not have an impact on whether the measure met RBRs or not. For both groupings (measures on farms with an AES and measures on a farm without an AES) 52% of the features assessed fail to meet the RBR,

although only a small proportion of farms (26% of ‘VM-CFE’ and 36% of ‘VM-other’) did not have an agri-environment agreement.

The probability that an individual RBR would be failed by the feature assessed was calculated for each of the measures with 95% confidence intervals (Figure 24). This takes into account the number of features assessed and the number of RBR criteria associated with each measure and the number of RBR that each of the features assessed failed on. It assumes that all RBR have an equal likelihood of being failed. Requirements of C3a were least likely to be failed, whereas those for in-field plots (C4 and C5) were most likely to be failed.

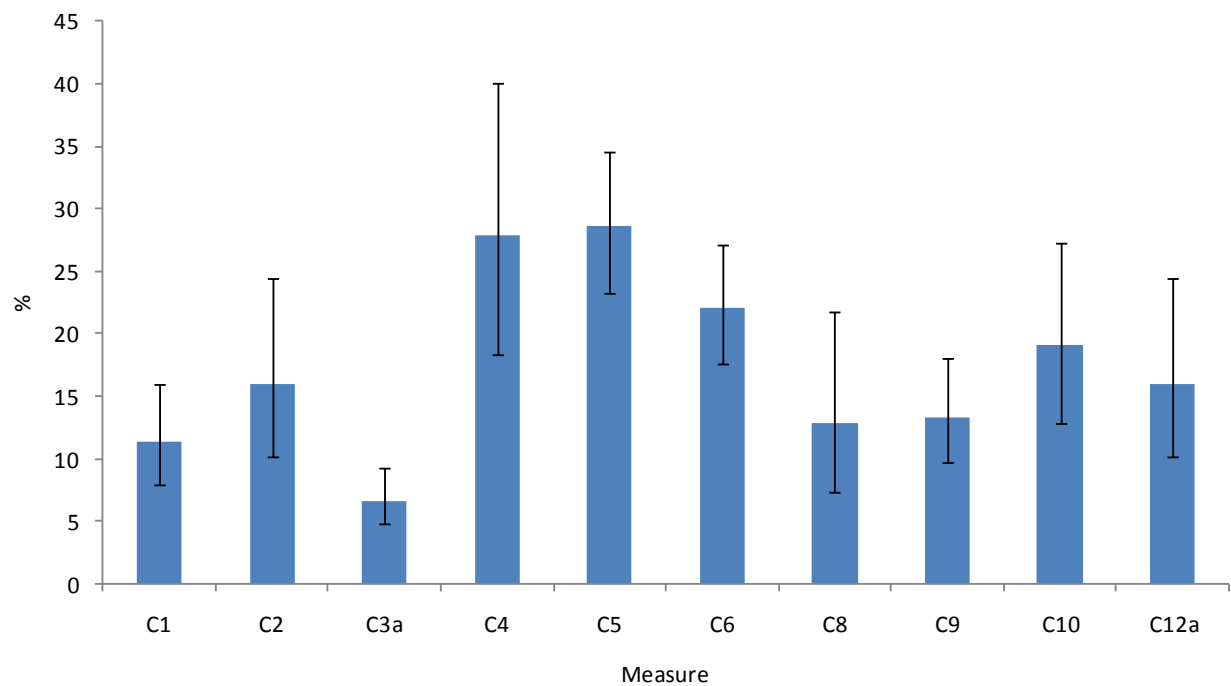


Figure 24 **Probability of failure for an individual RBR with 95% confidence intervals**

Table 40 **Number of farms, areas and number of features meeting Red Box Requirements (RBR) based on all available information.**

Measure	'VM-other'				'VM-CFE'							
	No. farms	Area - ha	No. of farms meeting RBR (%)	Area meeting RBR - ha (%)	No. farms	Area - ha	No. features	Features assessed	Area assessed - ha	No. Farms meeting RBR (%)	Area meeting RBR – ha (%)	No. features meeting RBR (%)
C1	12	26.72	7 (58)	19.46 (73)	29	91.51	90	53	14.10	12(41)	8.92(63)	28 (53)
C2	6	8.82	3 (50)	2.25 (26)	11	12.8	40	25	11.28	2 (18)	6.79 (60)	10 (40)
C3a	11	81.63	6 (55)	58.93 (72)	43	191.02	293	99	118.67	27 (63)	86.47 (73)	72 (73)
C3b	2	0.88	2 (100)	0.88 (100)	13	18.89	24	21	17.94	13 (100)	17.94 (100)	21 (100)
C4	1	7	0 (0)	0 (0)	11	301.31	21	17	306.97	1 (9)	90 (29)	3 (18)
C5	4	3.31	2 (50)	2.36 (71)	7	11.03	19	16	11.64	0 (0)	0 (0)	0 (0)
C6	2	3.5	2 (100)	3.5 (100)	16	183.73	30	25	173.52	2(13)	10.31 (6)	2 (8)
C7a	19	333.34	13 (68)	203.94 (61)	21	410.41	54	0	410.41	12(57)	219.11 (54)	
C7b	2	9	2 (100)	9 (100)	0	0	-	-	-	-	-	-
C8	1	0.5	1 (100)	0.5 (100)	5	5.77	18	14	2.54	1(20)	0.74 (30)	5 (36)
C9	3	2.2	0 (0)	0.0 (0)	21	18.73	44	39	18.9	6(29)	5.31 (28)	15 (38)
C10	14	42.31	9 (64)	33.56 (79)	21	151.73	127	49	26.87	11 (53)	13.42 (50)	27 (55)
C11	4	1.45	1 (25)	0.1 (7)	3	3.78	3	0	0	2(67)	-	
C12a	1	0.5	1 (100)	0.5 (100)	17	11.65	29	26	8.4	4(24)	1.82 (22)	4(15)
C12b	1	0.4	0 (0)	0 (0)	-	-	-	-	-	-	-	-
C13	2	2.4	1 (50)	0.2 (8)	-	-	-	-	-	-	-	-
C14	1	128	0 (0)	0 (0)	-	-	-	-	-	-	-	-
C15	2	31.04	1 (50)	30.84 (99)	-	-	-	-	-	-	-	-
Total (Mean %)	88	683	51 (58)	366.02 (54)	218	1412.36	792	384	1121.24	93 (42)	460.83 (41)	187 (49)

8.2.2.1 Reasons for failing to meet RBRs.

The proportion of 'VM-CFE' farms meeting RBR for individual features was highest for C3a, C3b C10 and C1 (Table 40). Reasons for RBR failure are presented in Table 41.

The most common reasons for both C1 (grass buffers) and C2 (grass areas to prevent erosion/runoff) failing to meet the RBRs were the features were too narrow or were used for regular access. The minimum requirement for width for a C1 is 6 m (including the 1 m cross compliance), whilst for a C2 it is 10 m.

A total of 13 C1 features failed because they did not meet the minimum width requirement. For the twelve C2 features that failed the RBR for width, all but 2 were at least 3 m in width.

Similarly, 20 features under C3a failed on width (minimum to meet RBR is 6 m). Twelve of these features that failed, had an average width equal to or more than 4 metres. Two of these had an average equal to or in excess of the 6 m requirement despite not being 6 m for the whole length of the feature. The second reason that features failed this measure was that the area was not cut.

Skylark plots (C4) usually failed because they were established at an insufficient density (typically between 1 and 4 per field), however plots were also too small, on tramlines and placed in small fields. A number of skylark plots resulted by accident, for example drill misses (Figure 25) and these always failed the RBR for density.

Fallow plots for ground nesting birds (C5) all failed due to their size (none were between 1 ha and 2.5 ha). They usually failed on a second additional RBR because they were adjacent to woodland or trees. Only one feature assessed as this measure was not a field margin or corner. For this feature the measure was applied to the whole field (5.5 ha). Three farms had failed to cultivate in February/March and therefore failed the RBR.



Figure 25 Skylark plot

Most farms with summer fallow (C6) had not created a fallow. However, half of the features under this measure failed the RBR because post-harvest herbicides had been applied.

Cultivation date and the use of pre-harvest desiccants or post-harvest herbicides were the most common reasons that features failed the RBR for C7a (overwintered stubbles). Many farmers were not specific about whether they would cultivate before or after this date, because it would depend on the weather conditions.

Table 41 Reasons for RBR failure for both ‘VM-other’ and ‘VM-CFE’ farms. Numbers in parentheses represent number of individual features, failures in italics are those assessed through visit interview.

Measure	Failure reason	‘VM-other’		‘VM-CFE’	
		No. farms	No. farms with failures	No. farms (features)	No. farms (features) with failures
C1	Width Silage Access Cultivation Next to watercourse	12	$\left\{ \begin{array}{l} 1 \\ 3 \\ 1 \end{array} \right.$	29 (53)	$\left\{ \begin{array}{l} 7(13) \\ - \\ 8(11) \\ 1(1) \\ 2(5) \end{array} \right.$
C2	Width Fertiliser Accessed <i>Grazed</i>	6	$\left\{ \begin{array}{l} 2 \\ 1 \end{array} \right.$	11 (25)	$\left\{ \begin{array}{l} 6(12) \\ - \\ 5(7) \\ 2(2) \end{array} \right.$
C3a	<i>Cut date</i> Width Cropped Access <i>Not cut</i>	11	$\left\{ \begin{array}{l} 2 \\ 1 \\ 2 \\ 1 \end{array} \right.$	43 (99)	$\left\{ \begin{array}{l} 8(20) \\ \\ \\ 4(9) \end{array} \right.$
C4	Under pylons <i>Density</i> Location <i>Field size</i> Plot size	1	1	11 (17)	$\left\{ \begin{array}{l} 9(14) \\ 4(5) \\ 2(2) \\ 3(3) \end{array} \right.$
C5	Adjacent to wood/trees Cropped <i>Fallow creation date</i> Size <i>Fallow not created</i>	4	$\left\{ \begin{array}{l} 1 \\ 1 \end{array} \right.$	7 (16)	$\left\{ \begin{array}{l} 5(6) \\ 1 (2) \\ 7(16) \\ 3 \end{array} \right.$
C6	<i>Fallow not created</i> <i>Post harvest herbicide</i>			16(25)	$\left\{ \begin{array}{l} 13 (21) \\ 8 (12) \end{array} \right.$
C7a	<i>Plough date</i> <i>Pre harvest desiccant or post harvest herbicide</i> <i>Manure/fertiliser</i>	19	$\left\{ \begin{array}{l} 5 \\ 2 \\ 1 \end{array} \right.$	21	$\left\{ \begin{array}{l} 7 \\ 8 \\ 4 \end{array} \right.$
C8	Width Erosion risk Next to road			5 (14)	$\left\{ \begin{array}{l} 1(2) \\ 2(6) \\ 1(1) \end{array} \right.$
C9	<i>Maize</i> Size	3	$\left\{ \begin{array}{l} 2 \\ 1 \end{array} \right.$	21 (39)	$\left\{ \begin{array}{l} 3(3) \\ 8(22) \end{array} \right.$
C10	<i>Maize</i> <i>Date destroyed</i>	14	5	21 (49)	$\left\{ \begin{array}{l} 10(22) \\ 1(2) \end{array} \right.$
C11	<i>Cultivate too soon</i> Width <i>Fertiliser</i>	4	$\left\{ \begin{array}{l} 2 \\ 1 \end{array} \right.$	3	$\left\{ \begin{array}{l} 1(1) \\ 1(1) \end{array} \right.$
C12a	<i>Cut date</i> <i>Cuttings not removed</i> <i>Not cut</i> <i>Seed mix</i> Area			(16) 17 (26)	$\left\{ \begin{array}{l} 1(1) \\ 1(1) \\ 1(1) \\ 4(6) \\ 1(2) \\ 10(19) \end{array} \right.$
C12b	Not cut	1	1		
C13	Width	1			
C14	Incorrect herbicide use	1			
C15	Long established	1			

Only five farms with C8 (uncropped cultivated margins) were visited, however almost half of the 14 features on these farms were considered to be on land at risk of soil erosion.

Wild bird seed mixtures (C9) and game strips (C10) both failed RBR because maize was included in the seed mix (particularly C10). However, maize was sown as a single crop on only three farms (Figure 26). Individual blocks of C9 were often below the minimum size threshold. The size distribution of these features (those that fail due to size) is shown in Figure 27.



Figure 26 Voluntary C10 Game strip that failed RBR

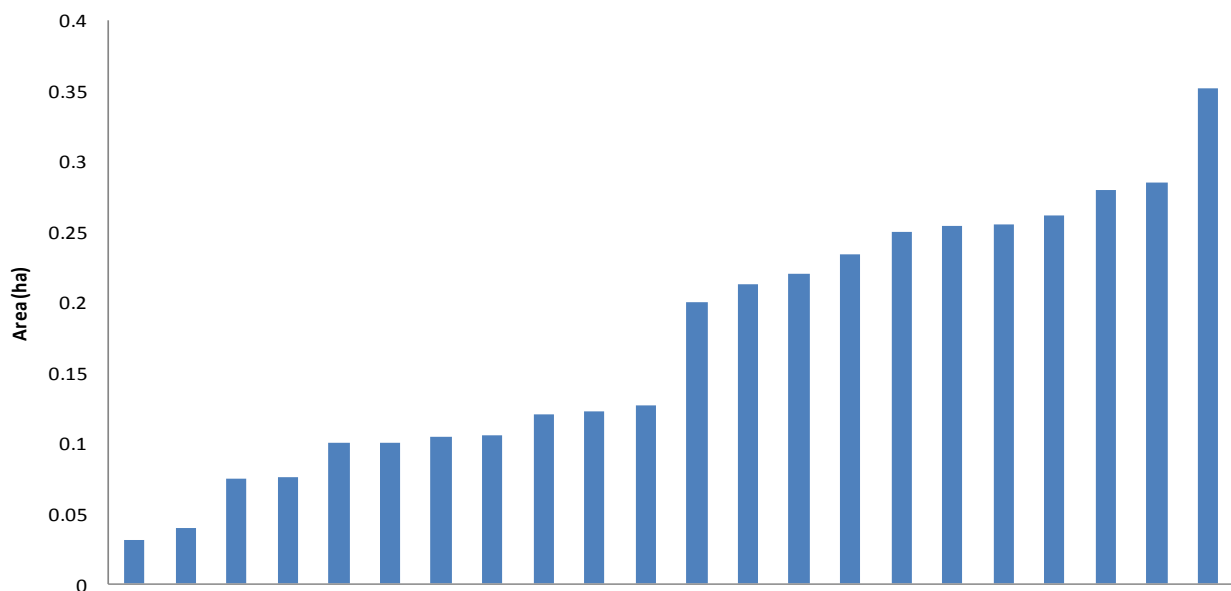


Figure 27 Variation in area of C9 measures failing the RBR due to area.

The most common reason that pollen and nectar mixes failed to meet RBRs was that the feature was below with minimum area of 0.4 ha. Most others that failed were not cut annually. Only two features failed to meet the requirement of sowing four nectar rich plant species (Figure 28).

a



b



Major vs minor fail

RBR that were failed by each measure are discussed below in an attempt to assess whether the failure should be regarded as a major or minor fail. Some RBR should always be treated as major fails. An example would be the application of fertilisers, organic manures or waste materials on a C1 grass buffer designed to prevent pollutant entering the adjacent watercourse. However, in some cases the reason for failing to meet the RBR could be regarded as a minor fail. An obvious example would be where the feature in question does not quite meet the minimum size specified, but meets all the other RBR. For instance, a C3a measure fails because it is 5 m wide and not the specified 6 m. A C9 may fail because maize or giant sorghum is included in the mix, however it may be possible to classify the severity of the failure dependent upon the proportion of the C9 that is maize or giant sorghum. Where minimum measurements are stated in the RBR, for the purpose of this report a minor fail has been classified as one that fails the size requirements by no more than 20%. The RBR failures encountered on the 'VM-CFE' farms are considered below in terms of major or minor failings as defined, although what constitutes a minor failure could be debated. Numbers of farms and features that would be considered minor fails are presented in Table 42.

One of the main criteria that C1 failed upon was the minimum required width of 6 m along the full length of the feature (including the 1m cross compliance strip). If this minimum width is reduced by 20% to 4.8 m, two additional measures would meet the RBR for width (both more than 5 m wide on average). Caution needs to be taken here as this is the average width - we do not know how variable the width was along the length of the measure. One of these measures also met the other RBR. Three features failed because they were not located next to a watercourse, all other RBR were met. These clearly do not meet the specification for a 'C1:Grass buffers alongside temporary and permanent watercourses' (aimed at resource protection).

Features recorded as C2, that failed the RBR on width (minimum 10 m) were all less than 8 m wide. The widest was 6 m, this would meet the 2011 RBR (see section 8.2.2.4) in terms of width (however this feature failed on an additional RBR).

The main RBR failed by C3a is the width. This measure should be a minimum of 6 m along the length of the measure (excluding the cross compliance strip). The 20 features on 8 different farms that failed this had average widths that varied from 13 m to 1 m (average widths were recorded for 15 of the features; the remaining 5 just stated that they did not meet the RBR for width along the full length of the feature). Four features were within 20% (or in excess) of the minimum required width (taking the average width). Two of these failed on width alone – and so will be considered a minor fail. A further eight C3a features were reported to have an average width of 4 m excluding the cross compliance strip, all were located next to a hedge. Six of these failed on width alone.

Failure to cut the area could be regarded as a minor fail, adding two more farms and three features to the ones that pass the RBR.

The incorrect density of skylark plots within a field is considered to be a major fail. All but two farms used the incorrect density. One of these farms met all the RBR, the other farm (with a feature each) failed because the skylark plots were on tramlines and the field was only 2.5 ha. These are also considered to be major failures.

The RBR for C5 specify that it must be a minimum of 1 ha and a maximum of 2.5 ha (and at least 100 m wide). All features failed on size plus at least one other RBR. Only one feature could be considered a minor fail – this exceeded the minimum requirement as it was 6.6 ha (whole field) and it was located next to a wood. However it did meet the other RBR, and if the 2.5 ha that is located furthest from the wood is considered, this area would meet the RBR for a C5.

The application of manure or fertiliser to a C7a feature is considered to be a minor failure. One farm failed on only this RBR. The application of desiccants and herbicides is considered a major RBR failure.

One C8 feature failed because it was located next to a road. However this feature was 30 metres wide (minimum width required is 3 m) and so it is considered to be a minor fail as the majority of the C8 will be located well away from the roadside. In addition, two features on one farm failed because they were not wide enough. One was 2.5 m and the other was 2 m. The one at 2.5 m has been taken to be a minor fail (lies within 80% of the width specified). The main reason that this measure fails to meet the RBR is that it is located in an area that is at risk of soil erosion. This is considered to be a major fail.

The minimum size specified as a RBR for C9 is 0.4 ha. As can be seen from Figure 27, if this was reduced by 20% to specify a minimum of 0.32 ha one more C9 would meet the RBR (this will be considered a minor fail). In the 2011 guidance there is no minimum size specified as a RBR for C12a (discussed in section 8.2.2.4) which in 2010 was set at 0.4 ha. The removal of the minimum size for C12a significantly increases the number of features that meet the RBR (16% to 65% meeting RBR). If this was applied to C9 features, all but one of the features shown in Figure 27 would meet the other RBR associated with C9. Three C9 features failed because maize was included in the mixture. Two failed on this alone – one of these had a mixture of 6 seed bearing species (one being maize). Maize made up less than 20% of the mixture therefore the other seeds would be a useful resource to farmland birds. This has been included as a minor fail.

The RBR most commonly failed for C10 was the inclusion of maize in the mixture. Three of the 10 farms that failed (with four C10 features) had a pure maize strip – this is a major fail. One farm with two C10 features included only dwarf sorghum with the maize and was also considered a major fail. In all other cases maize has been included within a mixture of species, containing at least four species in total. These have been taken to represent a minor fail (assuming they pass the other RBR) as they will still provide resources for farmland birds. This means five additional farms with 12 additional features would meet the RBR.

The one C11 unharvested cereal headland failed did so as a result of fertiliser was applied to the margin as it is to the rest of the crop. This has been classified as a minor failure.

The main RBR failure of C12a was on the size of the feature. As discussed in section 8.2.2.4 this RBR has now changed (width is not included in this section on major and minor fails). The one feat that had the incorrect cut date was topped in February/March every other year – this is considered a minor failure. The requirement to cut the area annually is considered to be a minor failure, however all these features also failed on size.

Table 42 Importance of RBR failures and potential for meeting RBR of other measures. Number of farms* with number of features in parentheses.

Measure	n	Total fail	Minor fail	Met other RBR
C1	29 (53)	17 (25)	1(1)	6 (12)
C2	11(25)	9(15)	0	2 (4)

C3a	43 (99)	16(27)	2(5)	0
C3b	13 (21)	0	-	0
C4	11 (17)	10(14)	0	0
C5	7(16)	7 (16)	1(1)	3 (6)
C6	16 (25)	14 (23)		0
C7a	21	9	1	0
C8	5(14)	4 (9)	2(2)	0
C9	21 (39)	15 (24)	2(2)	11 (22)
C10	21 (49)	10(22)	5(12)	0
C11	3	1 (1)	1(1)	0
C12a	17(26)	13(22)	1(1)	0

*maximum number of farms that failed. Features under a measure could both fail and pass RBRs on the same farm.

Likelihood of meeting RBR for an alternative measure

In 2011, features were assessed against the RBR for the measure that the farmer considered it to be. This was in contrast to 2010, when, because of the level of confusion amongst farmers, surveyors matched the features to the most appropriate measure as far as possible. In order to assess the maximum level of compliance with RBRs in 2011, those features that failed RBRs based on the measure indicated by the farmer, were assessed against the requirements for other measures (Table 42). However, it should be noted that full details of management appropriate for 'alternative' measures were not always collected. Not all measures have potential alternatives. C1, C2 and C12a could be reclassified as C3a. In addition, C5 could be reclassified as rotational C3a, although it is likely that it would represent land uncropped for less than a full year. C9 features were reassessed against the requirements of C10.

Twelve C1 features on six farms would have met the requirements for C3a. On two farms, 5 of the 6 features were not next to a watercourse. On five farms, 7 of the 9 features were used for occasional access. Four C2 features on four farms would again have met the requirements for C3a. Two features were grazed and two were used for regular vehicle access. No C5 features met the RBRs for this measure because all but one (which was a whole field) were located at the field margin. Six of these features could have been classed as C3a rotational features (if there was no spring cultivation and the areas were sufficiently wide) although these features would have been rotated annually and there would have been no attempt to 'establish a grassy sward' required by C3a. Most C9 features that failed the requirements for this measure, did not meet the minimum area, but would meet the requirements for C10 because no minimum area is specified. Overall 44 features (20% of features that failed RBR or 11% of all features assessed) would have met the red box requirements of a different measure.

8.2.2.3 Measures implemented directly for the campaign or with changed management

For each measure in place, the 'VM-CFE' farmers were asked '*would you have done this in the absence of the campaign?*'. Those that responded '*no*' (in total 38 farms, with 45 different features) were considered to have undertaken voluntary management directly as a result of the Campaign. This is considerably higher than the eight (of 97) who had responded '*no*' last year. However, without further work to ascertain the date the features were established these figures should be read with caution. Pollen and nectar mix (C12a) wild bird seed mix (C9) and skylark plots (C4) were most commonly implemented specifically in response to the Campaign (Table 43). Overall, 54% of farms implementing voluntary measures specifically for the Campaign met the RBR, therefore there was no apparent difference in the quality of management between land already uncropped and land taken out of production in response to the Campaign.

Table 43 Measures undertaken specifically in response to the Campaign.

Measure	No. of farms	Meets red box requirements	Reasons for failure
C1	2	2	
C3a	6	5	Not cut/grazed
C3b	2	1	Not cut/grazed
C4	8	2	Density
C5	2	0	Not cultivated in spring and area
C6	4	0	Not cultivated in spring
C7a	5	1	Pre harvest desiccants
C7b			
C8	2	0	Erosion risk, next to road
C9	11	7	Size & maize
C10	4	4	
C12	12	9	Not cut & cuttings not removed

8.2.2.4 RBR failures under the 2011 specification

Several of the RBR criteria have changed since the original Farmers Guide was produced in 2011. The changes in RBRs introduced in 2011 are described below;

- C2 – minimum width of measures reduced from 10 m to 6 m.
- C3 – in 2010 it stated ‘do not cultivate the area after the area has been established’; this has been removed in the 2011 version.
- C6 – the requirement to create a fallow in late February has been removed.
Wording relating to herbicide application has changed. 2010 ‘Herbicides can be applied for weed control from 15 May’. Now the phrase ‘but environmental benefits may be reduced’ added on to the end.
- C7a- date that the land can be cultivation and returned to the farm rotation has changed. In 2010 the stubble could be returned to cultivation from the 1st March. In the 2011 handbook the stubble can ploughed from the 15th Feb but it states that advantages will be greater if the area can be left longer to provide valuable resources for birds at a time when they struggle to find food. Date of 1st March now moves into the green box additional management considerations.
- C12a – 2010 specified a minimum area of 0.4 ha. In the 2011 guidance there is no minimum area.
- C15 – 2010 states to not apply herbicides after planting. The 2011 guidance states that applications are permitted for the establishment of the crop but not there after (can use in est. year and after first cut only).

2010 states to not use insecticides. In 2011 this still stands but it says that if this is necessary the area cannot be recorded as voluntary for one year to allow for recovery.

Data for individual features that did not meet the 2010 RBRs were reanalysed against the 2011 requirements. The number and area meeting the RBR of two of these measures, C6 and C12a has increased (Table 44). The slight alteration to the criteria for C2 and C3a did not impact the number/area of features meeting the RBR. This is surprising for the C2 option where the minimum width has decreased from 10 m to 6 m. One of the C2s assessed would have now passed the RBR for the width but this feature also failed on a second criteria. Using the 2011 criteria, the

number of C6 features meeting the RBR increased from just 8% to 68%, and C12a rose from 15% to 65% (Table 44). These increases make a major difference to the overall area (47%) and number of features (55%) meeting the RBRs.

Table 44 Impact on 2011 RBR criteria on compliance rates (shaded lines have had changes to criteria, percentages are shown in parentheses)

Measure	No. features assessed	Area assessed - ha	2010 RBR criteria		2011 RBR criteria	
			No. Features meeting RBR (%)	Area meeting RBR	Features meeting RBR	Area meeting RBR
C1	53	14.10	28 (53)	8.92(63)		
C2	25	11.28	10 (40)	6.79 (60)	10 (40)	6.79 (60)
C3a	99	118.67	72 (73)	86.47 (73)	72 (73)	86.47 (73)
C3b	21	17.94	21 (100)	17.94 (100)		
C4	17	306.97	3 (18)	90 (29)		
C5	16	11.64	0 (0)	0 (0)		
C6	25	173.52	2 (8)	10.31 (6)	17 (68)	100.32 (58)
C7a	21 farms	410.41	219.11	12 farms	219.11	12 farms
C7b	-	-	-	-		
C8	14	2.54	5 (36)	0.74 (30)		
C9	39	18.9	14 (36)	5.31 (28)		
C10	49	26.87	27 (55)	13.42 (50)		
C11	0	0		-		
C12a	26	8.4	4(15)	1.82 (22)	17(65)	5.76 (69)
TOTAL	384	710.83	182 (47)	239.09 (34)	210(55)	333.04 (47)

8.2.2.5 Comparison of management of land in and outside the Campaign

Interviews of 'VM-other' farms were carried out as fully as possible over the telephone to establish whether the features met all the RBR and could therefore be considered as contributing to Campaign targets. These telephone interviews were more comprehensive than the interviews undertaken with the participants, as the additional field data was used to establish whether many of the RBR were met on 'VM-CFE' farms that were visited by surveyors. In order to compare 'VM-other' and 'VM-CFE' directly, a separate comparison was made with some of the information collected over the telephone interview excluded, so that the information matched that which had been collected during the interviews with the 'VM-CFE' farmers. For comparison with 2010, measures have been assessed against the original RBR as mentioned above, however changes to management guidance for some measures means that a smaller proportion will not meet current RBR (see 8.2.2.4). Features were assessed against the RBR for the measure that the farmer indicated they were undertaking.

The number of farms that failed on visit interview questions only for both 'VM-other' and 'VM-CFE' farms is shown in Table 45 in the column 'interview fail'. Table 45 also shows the total number of farms that failed after all the available information was collated.

Table 45 **Number of farms failing to meet RBR for visit interview questions alone and all available information.**

Measure	'VM-other'			'VM-CFE'		
	n	Interview fail	Total fail	n	Interview fail	Total fail
C1	12	0	5	29	0	17
C2	6	0	3	11	2	9
C3a	11	2	5	43	4	16
C3b	0	-	-	13	0	0
C4	1	0	1	11	9	10
C5	4	0	2	7	4	7
C6	0	-	-	16	14	14
C7a	19	6	6	21	8	9
C7b	0	-	-	0	-	-
C8	0	-	-	5	0	4
C9	3	3	3	21	8	15
C10	14	5	5	21	7	10
C11	4	2	3	3	1	1
C12a	0	-	-	17	6	13
C12b	1	1	1			
C13	1	0	1			
C14	1	1	1			
C15	1	1	1			
% of farms failing RBR	78	27	47	218	29	57

Based on interview questions alone, 71% of 'VM-CFE' farm/measure combinations and 73% of 'VM-other' farm/measures apparently met the red box requirements. However, when all available information was assessed, only 43% of 'VM-CFE' and 53% of 'VM-other' farm/measures met RBR. In the absence of field verification, it seems likely that the genuine proportion of 'VM-other' farms meeting the RBR is lower than these results suggest. However, given the reasons that the farmer chose to record the land as uncropped but not contributing to the Campaign (Table 39), such as the measure was present before the Campaign, or the farmer was not aware of the Campaign, it is likely that some of these measures will meet the RBR.

8.2.3 Green box criteria

In addition to the red box requirements, green box management considerations (GBMC) can be implemented to increase the environmental benefits. The green box guidance varies between measures. In most cases it is possible to quantify those green box management actions that have been implemented, however some green box management considerations are subjective or unmeasurable and it is not possible to quantify the number of farms/features meeting these. Those that are measurable are detailed in Table 46.

Table 46 Measurable green box considerations (adapted from CFE Farmer's Guide)

MEASURE	GREEN BOX CONSIDERATIONS
C1	<ul style="list-style-type: none"> • If established more than 1 year, cut 3 m near crop annually after July 31st, other 3 m cut no more than every two years & Ideally remove cuttings • If prone to erosion do not use more than 10% cocksfoot in seed mix
C2	<ul style="list-style-type: none"> • Seed mix no more than 10% cocksfoot in seed mix (if sown) • Remove compaction in topsoil and subsoil • Cut regularly in first 12-24 month <p>After first year 12-24 months: Cut outer 3 m annually after July and remaining area no more than every 2 year</p>
C3	<ul style="list-style-type: none"> • Storage OK but avoid compaction of areas that could lead to erosion and run off • Regular cutting in first 2 year & ideally remove cuttings • Sow grass if lots of bare ground • Light cultivation can be beneficial • Beneficial to move around farm every 3 year and locate next to watercourse and hedgerow/woodland
C4	<ul style="list-style-type: none"> • Manage in same way as rest of field • No requirement to keep plot weed free
C5	<ul style="list-style-type: none"> • Avoid fields with pernicious weeds • Areas of severe compaction should be subsoiled • Don't place in field surrounded by tree lines or adjacent to woods unless larger than 10ha field • Ideally locate where curlew and lapwing have nested before • Locate next to intensively grazed field will provide improved habitat for chick rearing • Control undesirable weeds before creating the fallow
C6	<ul style="list-style-type: none"> • Should not cultivate before 31 July unless organic • In exceptional circumstances can apply herbicide to destroy the green cover before May • Other agric operations that may harm biodiversity should be avoided • Can store organic manure but not more than the volume that will be applied to the field • Temp storage ok but should avoid compaction and track storage
C7	<ul style="list-style-type: none"> • Avoid fields with undesirable weed infestations? • Light cultivation on a clean stubble after harvest may be beneficial to encourage weed germination
C8	<ul style="list-style-type: none"> • Can be beneficial to cultivate some margins in the spring and some in Autumn • Can use targeted broad spectrum herbicides to prevent build up of pernicious weeds once the seeds have set. • Can leave in place over winter • Can relocate in new field or relocate in same field following year to avoid build up of pernicious weeds • Can be beneficial to vary time and depth of cultivation
C9	<ul style="list-style-type: none"> • Either: sow balanced combination of at least three small seed bearing crops from wheat, barley, triticale, kale, quinoa, linseed, millet, mustard, fodder radish, dwarf grain sorghum and sunflower. If sown as a mixture no single species should make up more than 70% weight of the mix.

	<p>OR: if establishing several blocks/strips across your holding can use one small seed bearing crop but ensure you vary the crops used between blocks</p> <ul style="list-style-type: none"> • Can seek advice from local wildlife advisor • Sow at optimum time for chosen mixture • Remove compaction before sowing • Sow either annually or every other year if biennial crops are included • Tramlines and severe compaction should be removed after harvest where there is risk of run-off and erosion • Avoid sowing too early in spring • Can use non selective herbicides prior to sowing • Can use fertiliser and manure but not within 10m of a watercourse
C10	<ul style="list-style-type: none"> • Either un-harvested cereal crop or sown • More benefit if more at least 6m wide, edge of field and 0.4ha • Distribute across farm • Remove severe compaction pre drilling if erosion is likely • Fertiliser and manure not within 6m of watercourse • Can use non residual, non selective herbicides • Avoid sowing too early in spring • If seed still present leave crop later than mid Feb
C11	<ul style="list-style-type: none"> • Headland can be planted by drilling or broadcasting, autumn or spring, with triticale, wheat, barley or oats.
C12	<ul style="list-style-type: none"> • Re-establish mix as necessary • Cut half area to 20cm between mid June and end of first week in July • Don't cut if know ground nesting birds present • Late Autumn/ early winter grazing is allowed but avoid poaching • Avoid adding lime
C13	<ul style="list-style-type: none"> • Seek advice on best wildflower mix • Cutting- regular in first 12 months may be needed to control weeds- ideally remove cuttings • Leave 2 m near boundary, such as hedge uncut • If excess vegetation may suppress flowers cut again before April
C14	<ul style="list-style-type: none"> • From SAFFIE most beneficial treatment was single application of amidosulfuron in March • To avoid build up of severe weed populations, not recommended to be located in the same location in consecutive years

The features that met the RBR were assessed to see whether they met any of the green box management considerations in addition, and if so which ones they met. The findings are summarised below;

C1 – 28 measures over 12 farms met the RBR. Of the two measurable GBMC, none of these features were considered by the surveyor to be at risk of erosion and so this GBMC is not applicable. Only one farmer with one C1 measure met all GBMC and RBR - following the cutting regime advised and removing the cuttings. Of the other 11 farms, three followed the advised

cutting regime but none of these removed the cuttings. In addition, one further farmer said that there would be '*Variable cutting - will leave those that look particularly good habitat for longer*'. Overall 5 farms, with 7 features met at least one of the additional GBMC.

C2 – Unfortunately no farm met all RBR and GBR fully. However, both the farms that did meet RBR had used a seed mix that did not consist of more than 10% cocksfoot and they had both taken steps to remove compaction. As with the C1 GBMC, it is the specified cutting regime upon which most of the farms fail to fully meet the GBMC.

C3a – 27 farms and 72 features met the RBR. All features were managed in a way that meant they also met at least one of the GBMC. All but 5 individual features, on 2 farms were located next to a watercourse, hedgerow or woodland. Four farms did use these areas for the storage of manure but it had not led to compaction, erosion or run off at the time of the field visit. The C3a area was cut once each year on all but 3 farms with one feature each, these had opted to cut the area twice each year. A total of six holdings removed the cuttings (all these only cut the area once a year). None of the farms meeting the RBR had the intention of relocating the measure, and none intended to cultivate the area.

C4 – one farm met the RBR and GBMC fully. Despite the other 10 farms and 18 features failing the RBR (mainly because of density), all of these would have met the GBMC.

C5 – No features met the RBR, therefore this measure is not considered further here.

C6 - two features on two separate farms met the RBR, neither farm was organic. The area recorded as C6 was not used for storage of any machinery/manure. On both occasions the land would not be brought back into the rotation or cultivated until the August/September the following year, and glyphosate (used on one feature) was not applied until August. Both features met the RBR and the GBMC.

C7a - twelve farms met the RBR. Field assessments have not yet been carried out on this measure so the first of the GBMC cannot be fully assessed. Of the twelve farms, just one intended to undertake a light cultivation after harvest to encourage weed growth.

C8 – Five individual C8 features met the RBR but only one farm met the RBR on all its features. All five features did achieve at least one GBMC. Three of them would be left in place over winter, two were to be cultivated in both autumn and spring and one C8 margin would be relocated each year.

C9 – Six farms (with 14 C9 features) met the full set of RBR. Unfortunately reliable information on seed rates and composition could not be obtained from each of the farms. Information is available for 5 farms; two of these did use a mix that met the GBMC. One of these two farms (with a single C9) met all the GBMC. Encouragingly 13 out of the 14 features that met the RBR also met at least one of the additional GBMC. Five of the six farms intended to replace the seed mixture at least every other year. Four farms had received advice on the most appropriate seed mixture to use, this advice coming from the seed companies that the seed was supplied by.

C10 – In all cases the farmer opted to sow the game cover strips rather than leave unharvested cereal headlands. None of the measured assessed were located next to a watercourse, compaction was removed on all features before the strips were established. All features met two additional GBMC- they were located at a field edge and the farmer was stated that they would leave them in place until after February if seed still remained. Additionally all but 4 of the features (all located on one farm) were in excess of 6m in width.

C11 – Both farms meeting the RBR also meet the GBMC.

C12a – Four farms with a single C12a each met the RBR for this measure. Lime was not applied to any of these four features, nor was any of the four grazed or treated with lime. One of the farms also followed the GBMC and cut the area as suggested in the additional considerations.

8.2.4 Areas of land under CFE measures

The area of land in voluntary measures or management similar to voluntary measures was recorded using GPS devices or maps. For the analysis relating to the areas the measures were

split into two categories; 'Uncropped measures' and 'Cropped measures'. Uncropped measures are those that are on land that is uncropped for the entire year, and cropped measures are those that are cropped for part or all of the year (C4, skylark plots and C7a, overwinter stubbles). The average size of each feature was calculated using the GPS data collected from the features assessed on the field visit (Table 47).

Table 47 **Average size of individual measures**

Measure	Number of measures assessed	Average size (ha)
C1	53	0.27
C2	25	0.45
C3a	99	1.20
C3b	20	0.78
C4	17	18.06
C5	16	0.73
C6	25	6.94
C8	14	0.18
C9	21	0.89
C10	49	0.55
C12a	26	0.32

For each visited farm, land recorded as either OT1 or OT2 on the Single Payment Scheme return was amalgamated to establish the total arable area for the holding. This in turn was used to calculate the percentage of the arable area on each farm that was considered to be under a Campaign measure. Skylark plots were often implemented singly in fields. The recommended density for skylark plots is two per hectare, so each plot was considered to be equivalent to 0.5 ha.

For those farms that had uncropped measures, these measures covered on average 4.95 % of the arable farm, similar to 4.73% in 2010. For the farms that had cropped measures, an average of 15.41% of the arable area was under one or more of these measures (this figure was calculated excluding the one of the farms shown in Figure 30 that implies 100% of the land is in cropped measures). The percentage of each farm under cropped or uncropped measures was categorised and the distribution is shown in Figure 29.

Figure 30 and Figure 31 show the proportion of arable area that farms are contributing to CFE in relation to farm size. The two outliers in Figure 30 (that appear to have nearly 100% of the farm under cropped voluntary measures are farms that claim to have all their croppable land (OT1 & OT2) in measures C7a and C7b. One of these farms was a mixed farm and the land was prone to being waterlogged so only spring sown crops were grown, details on the second farm are less clear (and hence excluded in the average area under cropped measures).

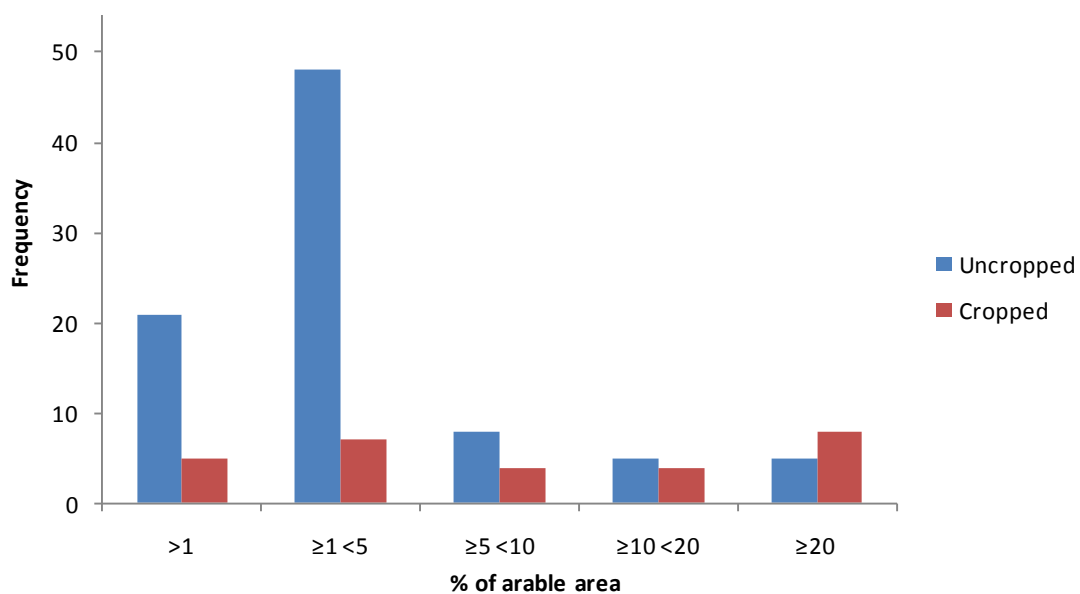


Figure 29 Distribution of farms with varying percentages of land under cropped and uncropped Campaign measures

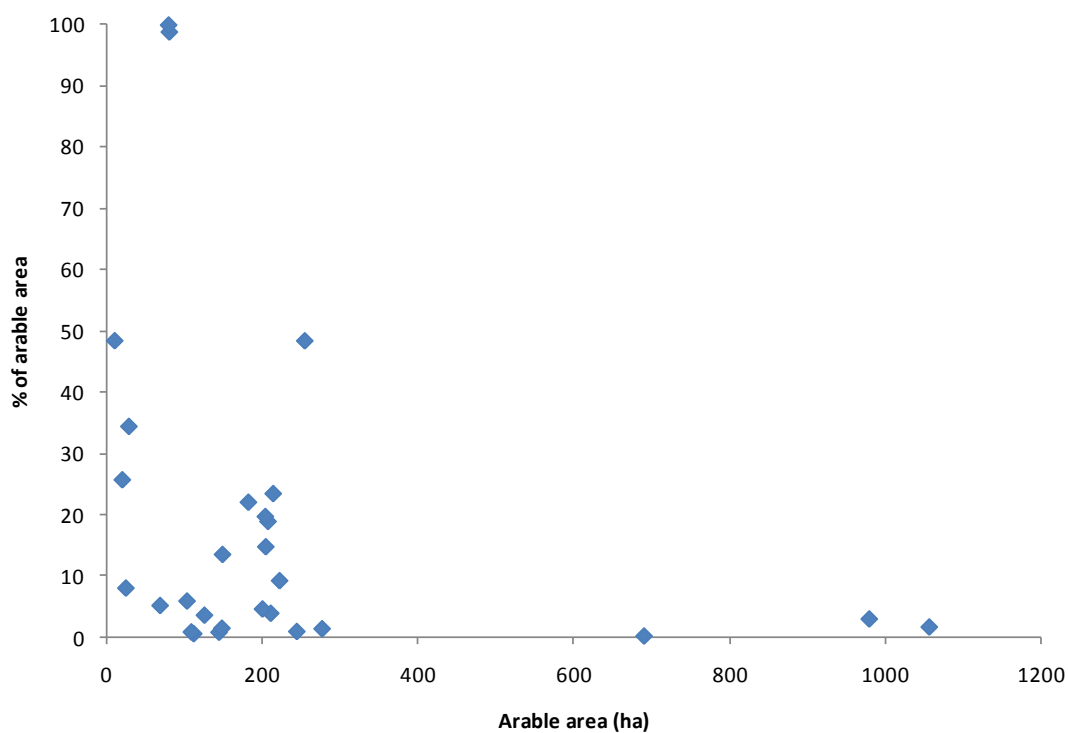


Figure 30 Percent of arable area on individual farms under cropped voluntary measures

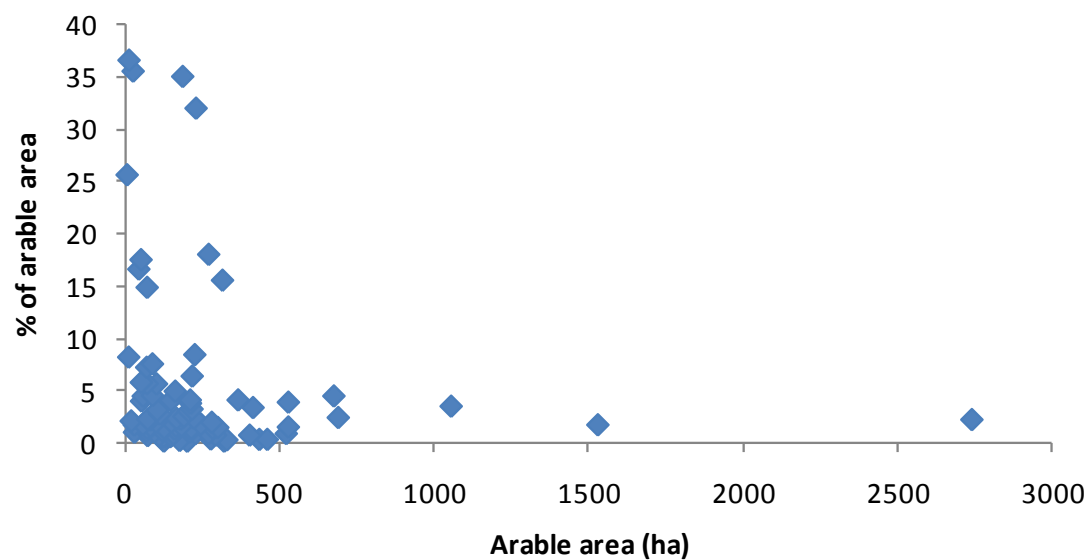


Figure 31 Percent of arable area on individual farms under uncropped voluntary measures

9. DISCUSSION

Although in general support for the Campaign is high, it is notable that support for the approach is lower than in 2010. Farmers undertaking voluntary management as part of the Campaign are concerned that only a small proportion are contributing to the voluntary management targets, although a slightly higher proportion were positive about the voluntary nature of the Campaign. These results are rather different to the overall results from the Defra postal survey conducted in February²⁰ (Clothier, 2011), where support was lower but increased in 2011. Also there was no change in the proportion that did not support the Campaign. However, only a subset of farmers were interviewed for this study of voluntary measures and a much larger proportion of farmers were undecided in the Defra survey (possibly as a result of the survey method). It should also be noted that the Defra results were weighted to relate to the overall population, whereas those presented here are not.

Records showed that the data recorded by farmers on the postal questionnaire were not totally reliable. On average, there were 19% fewer farms with each measure than recorded on the postal survey form, but this figure represented a loss of 30% and a gain of 11% in farms with measures present. This suggests that many farmers still do not have a clear idea of what constituted management as part of the Campaign. However, more farmers had implemented measures specifically in response to the Campaign than in 2010.

The Defra survey suggests that those farms with an agri-environment agreement are implementing a larger number of voluntary measures as part of the Campaign. This is not reflected in the results from this study, where those with and without an AES agreement were, on average, managing the same number of different measures voluntarily as part of the Campaign. However, the much smaller average area managed under Campaign voluntary measures on farms with an AES agreement compared to those without, may reflect the attitude amongst these farmers that once land had been taken out of production for an AES, the potential for further voluntary management was limited. However, the sample of farmers in this study without an AES agreement was small.

It is clear that many farmers implementing voluntary measures are not following the 'red box' requirements fully, and the proportion of farmers that are meeting the requirements has not changed significantly since the previous year. This was found to be the case even for measures implemented after the start of the Campaign. A similar lack of clarity is apparent amongst those with voluntary management outside the Campaign. Telephone surveys suggested that a significant amount of management recorded as not contributing to the Campaign, probably meets the red box requirements (apparently not greatly different from the proportion of management claimed as contributing to the Campaign, though care should be exercised in comparing data from the telephone survey and the visit survey).

The degree of environmental benefit may not be greatly affected by failing to meet the red box requirements, for example where part of a buffer strip is slightly less than the prescribed width. In other cases there will be a large impact on the achievement of the intended objectives, for example where game crops are composed largely or entirely of maize or fallow plots for ground-nesting birds are located next to woodland. Further consideration of the importance of different red box requirements, and the impact of failing to follow them, would aid interpretation of the effects of red-box failures on environmental benefits. Serious breaches could then be addressed by targeted messages through the Campaign publicity and communications operations.

²⁰ Clothier L. 2011. Survey of land managed under the Campaign for the Farmed Environment: additional analysis. Defra Agricultural Change and Environment Observatory Research Report No. 28.

It is clearly important to continue to encourage farmers to follow the red box requirements, and to encourage them to record all compliant features as voluntary measures. However, only around half of farmers responding to the Defra survey were undertaking voluntary management. Similar to the Defra postal survey, many farmers interviewed were already managing land for the environment and were not intending to implement further measures for the Campaign. This clearly indicates that greater engagement with these 'non-participants' is also required to increase the level of voluntary management overall. Results from the interviews of 'VM-CFE' and 'VM-other' farmers, suggest that a similar proportion of features considered as part of the Campaign and outside it, would meet the RBR. Hence the area of land managed according to Campaign guidelines may be significantly greater than analysis of those who consider themselves to be contributing suggests. However, analysis of those outside the Campaign is based only on telephone surveys compared to a combination of interviews and field visits, therefore field survey is needed to confirm the quality of management of land considered outside the Campaign.