Natural England Commissioned Report NECR133

Monitoring the Impacts of Entry Level Stewardship

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Foreword

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

Background

Environmental Stewardship (ES), launched in 2005, is run under the Rural Development Programme for England (RDPE) and contributes to strategic priorities for biodiversity, natural resource protection, sustainable farming and food and sustainable rural communities.

This survey is part of the ES monitoring and evaluation programme, providing an evidence base for the effectiveness of ES. It focuses on Entry Level Stewardship and Organic Entry Level Stewardship ((O)ELS).

It builds on baseline monitoring carried out during the initial 18 months of (O)ELS in 2005/06 to evaluate:

- outcomes from agreements established in the first two years of the scheme;
- the potential of a second round of (O)ELS agreements to deliver a higher level of environmental benefits identified in revised targets set by Defra and Natural England in 2010; and
- the role of the Enhanced Training and Information Programme (ETIP), launched in 2010 to support (O)ELS applicants and enhance outcomes.

The survey included questionnaire and interview surveys of agreement holder attitudes and field survey of environmental features and habitats.

Results indicate that there is strong support for the wildlife conservation benefits of (O)ELS among agreement holders and suggest that (O)ELS has been instrumental in raising awareness. A majority of the agreement holders surveyed appeared to be happy with (O)ELS.

However, the survey does raise questions around the extent to which environmental gains have been achieved.

Results support a continued role for advice provision suggesting that the impact of advice and guidance could be improved and that the scope should be widened.

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Natural England Project Manager - Lesley Blainey, **lesley.j.blainey@naturalengland.org.uk**

Contractor - Food and Environment Research Agency (Fera)

CCRI Project Manager - Nigel Boatman, **nigel.boatman@fera.gsi.gov.uk**

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Further information
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Authors : Nigel Boatman
Naomi Jones
Julie Bishop
James Blackburn
Simon Conyers
John Elliott
Caroline Hallam
Alistair Huntly

The Food and Environment Research Agency
Sand Hutton, York
YO41 1LZ, UK
www.defra.gov.uk/fera
Telephone +44 (0)1904 462000

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EXECUTIVE SUMMARY

INTRODUCTION

1. Entry Level Stewardship (ELS) and the organic equivalent were introduced in 2005, to provide support to farmers for management for environmental benefits. Evidence on the effectiveness of agri-environment schemes is required by the European Commission. The objectives of this study were to evaluate:

   - the 'success' of management under agreements established in the first two years of the scheme ('Phase 1') where baseline assessments are available from a previous evaluation;
   - the potential of the second round ('Phase 2') of (O)ELS agreements post-renewal to deliver a higher level of environmental benefits, and to meet the targets set out for ELS in 2010 by Defra and Natural England;
   - the role of the 'Enhanced Training and Information Programme' (ETIP), launched in 2010 to support (O)ELS and UELS[1] applicants, in enhancing the outcomes of 'Phase 2' ELS.

METHODOLOGY

2. The project comprised questionnaire and field surveys of participants and some non-participants. Phase 1 comprised a survey of 90 agreement holders from the sample involved in the initial evaluation in 2005/6. Postal and visit questionnaires obtained information on changes in attitudes and management practices during the first agreement and field survey of features assessed in 2005/6 assessed any changes in the quality of habitats/features.
3. Phase 2 targeted farmers renewing O/ELS agreements in 2010/11, who had received ETIP advice (60 farms) and those that had not (54 farms) but also included 46 farms for which there was no information on ETIP advice. The survey obtained baseline information on attitudes to the scheme and on option selection, placement and management for the new agreement. Field surveys of the condition and placement of features being managed under O/ELS and 'control' features on the same farms but not under agreement were undertaken. In addition a postal questionnaire and field survey was carried out on a sample of 40 farms without a current agri-environment agreement.
4. Questionnaires were a combination of tick box category questions and free text responses which were grouped into categories using an iterative process. Category designations evolved as further answers were added.
5. Field surveys recorded the characteristics of the features to indicate whether the management was likely to achieve the intended environmental benefits and included attributes that related both to the management and condition of the feature. Similar attributes were recorded in 2011/12 and 2005/6 in order to assess any changes. Control features were assessed on participant farms where available for features that were likely to occur both in and out of agreement on the same farm (hedges, ditches, hedge/ditch combinations, stone walls, in-field trees, woodland edges and grassland). A similar but larger range of features was assessed on non-participant farms.

[1] Uplands Entry Level Stewardship.

6. Detailed grassland assessments were made on a subset of 40 farms with features in low or very low input grassland options (EK2 and EK3) to assess whether management was creating swards that were attractive to invertebrates and birds. Detailed height measurements were made on three occasions using a sward stick.

Analysis

7. Statistical analysis of Phase 1 data concentrated on comparisons between 2005/6 and 2011, and between attributes assessed in the field for 'control' features within ELS options and similar features outside the scheme, on the same farm.
8. Statistical analysis of Phase 2 data was carried out at agreement and option levels. Scores were calculated to quantify value of agreements for different environmental themes, and these were compared between agreements within and outside priority areas, and between those which had, or had not, received ETIP advice. Field attribute data at option level were compared between option and control features (similar features on the same farms but outside agreement), and between features in agreement and similar features on non-participant farms.

RESULTS

Phase 1

Postal Questionnaire

9. A postal questionnaire was sent in 2011 to farms that had contributed to a baseline survey in 2005/6. A hundred responses were received from the baseline sample, of which 90 were visited.
10. In answer to 'tick box' questions, Improving conditions for farmland wildlife was seen as the most important contribution of ELS to *national objectives* in both 2005/6 and 2011, and the percentage of respondents who thought it was very important increased from 74% in 2005/6 to 92% in 2011. A lower proportion thought that ELS was important for other objectives (water and soil, landscape and the historic environment) in 2011 than in 2005/6, though changes were small and most respondents did not change their opinion.
11. Landscape was the objective cited by the highest percentage of respondents in 2005/6 in terms of the effectiveness of chosen options *on the respondent's holding*, but this had declined in 2011, so that improving conditions for farmland wildlife was considered to be the most important in 2011, with an increase observed between the two surveys. There was also an increase in the percentage who considered options effective for improving water quality and reducing soil erosion, though starting from a much lower base. The percentage citing historic environment changed relatively little.
12. In the baseline survey, over 60% thought that payment rates would cover their costs, and this rose to 74% in 2011. However, the percentage who thought their costs would not be covered also rose, from 11% to nearly 25%. Few thought points allocations were not appropriate, but of those who answered the question in relation to specific options, all thought the points allocations were too low.
13. Most farmers who received direct advice considered it to be 'very useful' for both option choice and option management. Hardly any thought it was not useful. A higher proportion of respondents considered other sources of information to be 'quite useful', though there were still few who thought they were 'not useful'. These included farmer

meetings, farm walks, Defra website, telephone advice and written material (excluding scheme handbooks). .

14. In addition to 'tick box' questions with pre-specified alternative responses, 'free text' questions were also asked to give respondents more scope to record their own views. Answers were categorised and tabulated by category

15. Wildlife conservation benefits were most frequently cited as the most positive aspects of (O)ELS, with the frequency of citation increasing between the two surveys. Answers connected with environmentally sustainable farming also increased. Financial incentive was the second most frequently cited, but the percentage declined between surveys.

16. Thirty three percent did not cite any negative aspects of (O)ELS in 2005/6, increasing to 41% in 2011. The percentage indicating bureaucracy, paperwork and/or administrative issues as being negative aspects declined from 31% to only 12% between surveys. There was an increase in the percentage citing hedgerow management issues, though from a very low base.

17. The great majority of respondents had not experienced any difficulties arising from the scheme. Where difficulties were reported, these were most commonly related to management restrictions or issues, weed control and scrub growth.

18. The percentage who reported that they were carrying out conservation work outside the scheme increased from 24 to 58% between the surveys. Work connected with trees and woodland was most commonly cited in 2005/6, but there were increases between 2005/6 and 2011 in percentages carrying out creation, management or restoration of hedges, ponds and wetlands, walls, and other habitats.

19. Impacts on the farm business were generally positive, including enhanced conservation of wildlife or the environment (increasing from 10% to 28%), less intensive agriculture and financial. Most thought that the payment rates would cover the cost of implementing the scheme.

Interviews

20. Interviews concentrated on issues relating to individual options or option groups, in contrast to the postal survey which concerned agreements as a whole.

21. Most thought that points allocations for different options were about right, especially in 2011. There were declines in numbers reporting that they were either too low or too high between the two surveys.

22. The majority of respondents said that the option in question would have no effect on their business, for all option groups. Views tended to be more positive in 2011, in particular for boundary and grassland options.

23. In both surveys, interviewees were asked: "If you had not chosen this option, would you still have carried out this management?" Three quarters said that they would in both surveys, for options concerned with boundary features. A slightly greater number said they would carry out the stipulated management under options for trees and woodland in 2011 compared to 2005, even if the feature was not included in their agreement, while fewer said that they would carry out the stipulated management for grassland and mixed stocking options and buffer strip management.

24. Over three quarters in 2005 indicated that management would continue if the farmer left the scheme, except for options for arable land and options involving management of trees and woodland. This question was not asked in 2011.

25. Fewer respondents said they cut hedges every year and more cut them ever 2-3 years in 2011 than in 2005/6. However, fewer said they would replant gaps or repair damage to hedgerows.

Field surveys

26. Hedgerow heights were analysed in categories. Most hedgerows increased in height between the 2005/6 and the 2011 survey. However, 4-5% of hedges in EB1, 2, 8 and 9, and 11% of hedges in EB3 and EB10 were still below the minimum prescribed height. In at least some of these cases, the hedges may have been laid or coppiced as part of a long-term management strategy. Control hedges were on average taller than hedges in ELS options on the same farm, possibly because some were inaccessible for management or they had been allowed to grow tall and the farmer did not wish to return them to management, so had not entered them into the scheme.

27. There was some change in the proportion of boundaries classified as lines of trees; around 9% of boundaries in EB1, 2, 8 and 9, but only 3% of those in EB3 and 10, were classified as lines of trees in 2011 that had not been in 2005/6. A small proportion that were classified as lines of trees in the earlier survey were no longer classified as such.

28. Width of hedgerows in ELS options increased on average by 0.3-0.6m between 2005/6 and 2011. Control hedges were wider on average than hedges in options on the same farm.

29. Most hedges showed no increase in the percentage of the hedge length that was composed of gaps, but where there was a difference, slightly more showed an increase than a decrease. No significant difference was detected in numbers of ELS and control hedges on the same farm in terms of percentage gaps.

30. Plant species richness on ditch banks in ELS decreased slightly on average between 2005/6 and 2011, thought this was only significant for EB 8, 9 and 10 (which were considered as a group), and not for EB 6 or 7.

31. Only a minority of ditches had submerged or floating vegetation present. In most cases there was no change in presence/absence of these categories between the two surveys. A higher proportion of ditches had emergent vegetation than submerged or floating vegetation, and presence was more likely where the ditch was not next to a hedge. Levels of change between surveys, both positive and negative, were generally greater where the ditch was not next to a hedge and both sides were managed.

32. Most stone walls in ELS had no gaps, but there was an increase in the number with a small proportion of the length (1-5%) composed of gaps. More walls had top stones missing or evidence of bulging, bellying or slumping, than had gaps, and there was evidence of deterioration in these respects between 2005/6 and 2011.

33. There was no significant difference between 2005/6 and 2011 in the numbers of in-field trees in ELS options in terms of cultivation beneath the trees, presence of fallen timber, livestock damage, storage of material or machinery, supplementary feeding or weed control. Cultivation was recorded beneath a quarter of in-field trees in 2011, livestock damage to 15% and evidence of weed control beneath 13%. Fallen timber was seen beneath 13%.

34. Six out of 51 woodlands in option EC1 (maintenance of stock proof fences around woodlands) had fences that were not considered stock proof in 2011, compared to eight in 2005/6.

35. A considerable reduction in the occurrence of detrimental indicators was seen on grassland in option ED% (archaeological features on grassland) between 2005/6 and 2011.

36. Evidence of compaction was noted in some fields in options EK2 and EK3 (permanent grassland with low or very low inputs respectively) in 2011, more than in 2005/6.

37. There were significant differences in species number per quadrat and total species number recorded per field, between fields in ELS options EK2 and EK3, and control fields (outside ELS) on the same farm. EK3 had the highest species numbers under both measures, followed by EK2, with control fields having the lowest numbers.

38. A higher proportion of fields in ELS options contained semi-improved or species-rich swards than control fields; this difference was significant for EK2.

Phase 2

Postal Questionnaire – agreement holders

39. A postal questionnaire was sent to a sample of farms with current O/ELS agreements to collect basic information about the farm, agreement, advice received and attitudes to the scheme. Results are presented for those farms which were subsequently visited.

Environmental issues

40. Over half (56%) farmers were undertaking additional conservation work outside an agri-environment scheme (63% of ETIP and 45% non-ETIP), most commonly tree/woodland/hedgerow management and pond/wetland creation/maintenance. Key environmental issues were considered to be resource protection/pollution and wildlife habitat/biodiversity.

41. The different objectives of the scheme were considered to be of the same relative importance at a national scale and at the farm-scale. However each objective tended to be viewed as slightly more important at a national scale compared to the individual farm. When asked how effective their previous O/ELS agreement had been, the relative importance of the different objectives was again the same, but farmers were less positive compared to their opinions of their current agreement. Improving conditions for farmland wildlife was considered most important, followed by water quality/erosion and landscape. Mitigating climate change was considered the least important objective of the scheme.

Impact of ES agreements

42. The most positive aspects of O/ELS were the biodiversity benefits (41%) and the fact that it provides the financial support for addressing environmental issues (27%). When asked about the negative elements, 22% of farmers indicated that there were none. The main concerns were the bureaucracy and complexity (15%), inflexibility of prescriptions (15%) and issues with specific prescriptions (13%).

43. Only 9% of farmers thought that there was a negative impact of joining O/ELS on their farming system and a quarter considered it to be a positive impact. Many (45%) thought that there would be no impact or that the effects would be negligible.

44. Most farmers (82%) thought the payment rates for their original agreement were sufficient to compensate for the cost of implementing the prescriptions. Aspects that were not covered by the payment rates were: hedgerow management, loss of stock feed, loss of productive land and seed mixtures. Similarly the points allocation was considered too low for hedgerow management (EB1), field corners, wild bird and nectar mixtures, low input grassland (EK2) and some arable options. However, although only 12 farmers

listed options for which they thought the points allocation was too low and low input grassland was also considered generous by two farmers.

45. Nearly two thirds (62%) of farmers felt more positive towards environmental protection as a result of membership of the scheme and none were less positive.

Postal Questionnaire – non-participants

46. A questionnaire was sent to a sample of farms without a current agri-environment scheme to collect information on awareness of and support for ES, reasons for not currently participating and opinions on environmental issues generally.

47. Most farmers were aware of ELS and HLS, although a slightly smaller proportion was aware of OELS. The farming press and scheme handbooks were overwhelmingly the most important sources of information for this group of farmers.

48. Similar to those with an agreement, non-participant farmers considered resource protection and pollution, sustainability and biodiversity to be the most important environmental issues. Conservation work outside agreement was carried out on similar proportions of participant and non-participant farms and similar work was being undertaken.

49. Most (79%) non-participant farmers were supportive of Defra funding ES schemes because of the financial support and benefits to the natural environment. Farmers gave a range of reasons for not currently participating, which included the 5 year commitment, complexity, incompatibility with the farming system, payment rate and a lack of interest. However, 57% would consider applying for ES in the future. The most common reasons for those who would not consider applying were: farm size/type, bureaucracy/compliance and age.

Farmer interviews – generic questions

50. For each option on the 160 participant farms, a series of generic questions were asked to assess changes in option selection, placement and management. Questions also established the farmers' opinions on the benefits of the option, the impact on the farming system and the value of any advice that had been sought.

Management change

51. At least one option was dropped at agreement renewal on more than a third of the farms where interviews were carried out; more than half of options dropped were priority options. These changes were similar for both ETIP and non-ETIP farms. (These figures do not include options removed from the scheme, e.g. management plans). At least one new option was added at renewal on 67% of ETIP farms and 61% of non-ETIP farms. Three-quarters of the new options added were priority options; this was similar for ETIP and non-ETIP farms. The option most frequently added was ED1 - Maintenance of weatherproof traditional farm buildings, which was introduced in 2008; this option accounted for 16% of added options.

52. Farmers reported that more than half of options were being managed in the same way within ELS as they had been prior to entering the scheme. The greatest continuity of management was for historic features (92%). The greatest change in management on entering ELS had occurred for arable options (77%) and buffers (54%). Farmers thought that 61% of features in ELS option would be managed the same if they had not gone into ELS, with little difference between ETIP and non-ETIP farms. This similarity in management was greatest for resource protection (88%) and historic features (83%) and lowest for arable features (37%) and buffers (48%).

53. For about three-quarters of options farmers had entered all of a feature into ELS, e.g. all their ditches. 6% of features not entered into ELS were not under their management control; this mostly affected ditches and woodland edge. Grassland was the habitat most likely to be managed differently when it had been kept out of ELS.

Impact of options

54. The effects of ELS were generally perceived as beneficial. Farmers considered that a third of ELS options provided lots of benefit, another third some benefit, and another third no benefit with less than 1% having a negative effect. Birds and other wildlife were thought to benefit the most, with lots of benefit from more than half of options. There were no significant differences in the perception of benefit between farmers on ETIP and non-ETIP farms.

55. Farmers considered that 72% of options had no effect on their farm business, 14% had a positive effect and 14% a negative effect. There were no significant differences in this conclusion between ETIP and non-ETIP farms. Most farmers interviewed were content with the distribution of option points: 83% options about right, 17% too low, <1% too high.

Information and advice

56. In general, farmers found that the option prescriptions were easy to follow; the difficulties encountered were mostly with buffers, arable options and boundaries. Problems were anticipated for 10% of options, with little difference between ETIP and non-ETIP farms, except for boundaries where more ETIP farmers had concerns. Buffer strips were the source of most worry, often because of unauthorised access issues.

57. Farmers on ETIP farms had sought advice for nearly twice as many of their options (34%) as those on non-ETIP farms (18%). Advice was sought most frequently for historic features, and least often for trees and woods. FWAG was more likely to be the main source of advice on ETIP farms, while land agents were more likely to be involved on non-ETIP farms. Natural England was named as the main source of advice on 28% of farms with little difference between ETIP and non-ETIP farms.

58. Farmers on ETIP farms were generally more satisfied with the advice they had received; 76% reported that it was very accessible compared with 57% on non-ETIP farms; 86% of farmers on ETIP farms reported that the advice was very useful compared with 71% on non-ETIP farms. Only 4% of farmers thought they would need more advice during the period of their current agreement.

Scoring priority options

59. Priority options (i.e. selected by Natural England as those that deliver the most benefit for the environment[2]) were scored for each relevant environmental theme on farms where they occurred, against a number of criteria covering option eligibility, condition and management relating to the environmental theme in question. Environmental themes (also defined by Natural England) included Farmland birds, Lowland wildlife, Resource protection and Historic environment.

60. The scores were weighted by the points accounted for by that option, as a proportion of the total points for that farm agreement. Weighted scores were analysed to compare agreements within and outside priority areas,[3] and those which had or had not received ETIP advice.

[2] www.naturalengland.org.uk/ourwork/farming/funding/es/agents/elsoptions/default.aspx.

[3] i.e. those where Natural England want them to be used more frequently.

Farmland birds

61. Wild bird seed mix (EF2) accounted for two-thirds of the farmland bird options encountered in the survey but scores for the implementation of this option varied widely (20-80%). Success in implementation was not related to the importance of EF2 to a particular agreement (in terms of points) nor on whether it was in an area designated as a priority for farmland birds. On average, farmland bird options achieved just over half the possible score.

62. Scores for farmland bird options were aggregated to provide a farmland bird score for each agreement, weighted by the proportion of points earned by these options. Although mean weighted scores were twice as high for farms in ETIP compared with non-ETIP farms, the difference was not statistically significant because of the variability within these groups.

Water voles, dragonflies, newts & toads

63. Ditches (EB6 & EB7) accounted for more than two-thirds of the options benefitting wetland species. Scores for these options varied widely (30-70%), but did not show a relationship with points or priority areas. The mean score for wetland options together averaged 60%. There were no significant relationships between weighted scores or option points with ETIP or priority areas.

Bats and dormice

64. Enhanced hedgerow (EB3) was the most commonly encountered option of those thought to benefit bats and dormice. The bat and dormice options averaged a score of 70%. There was no statistically significant difference between weighted scores for priority areas and non-priority areas, nor the difference between farms that had, or had not, received ETIP advice.

Butterflies, bees and vulnerable grassland

65. The very low input grassland option, EK3, was the most commonly encountered for this theme. Scores averaged 44% but varied greatly with respect to condition and management, from zero to 100%. The average score for all options contributing to this theme was 58%. The weighted scores for options in this theme were significantly higher for the non-ETIP farms; because the farms that had not had ETIP advice tended to have higher proportions of points accounted for by EK3 grassland. Weighted scores were similar for priority and non-priority areas.

Resource protection

66. The average score for resource protection options was 69%, but again there was a lot of variation in scores for some options. For ground water options, the average weighted scores were significantly higher on non-ETIP farms, because the non-ETIP agreements had a higher proportion of points from ground water options. Non-ETIP farms also had higher weighted scores for surface water options but this was not statistically significant.

Historic environment

67. The average score for historic options was 85%. There was no significant difference between ETIP and non-ETIP farms.

Analysis of individual interview attributes

68. Farmers were asked detailed questions about the management of all features in their ES agreement to ascertain the quality of management and to establish if prescriptions were being met. Most elements of prescriptions were not met by all farmers but the proportions who failed were usually low. Data represent farm/option combinations, therefore responses from a farmer with two similar options (e.g. EB1 and EB2) will be recorded twice.

Boundary features and in-field trees

69. Hedges under enhanced management (EB3, 10) were most likely not to meet the prescription requirements, generally because they were cut every two years (16%) or because farmers indicated that they were maintained below 2 m (11%). For features under standard hedgerow management only 1% did not meet cutting frequency and 2% height requirements. Around 3% cut at an inappropriate time of year and a similar proportion did not cut hedges in rotation. Most hedges were cut between September and December, but around one quarter were cut in January/February. Nearly half farmers replanted gaps and nearly one third layed or coppiced hedges.

70. Fallen wood was removed from beneath the tree canopy on 48% and 44% of holdings with EC1 and EC2 respectively.

71. Many ditches were not managed according to the prescriptions. Ditch bank cutting frequencies were very variable. Only 7% of farms cut annually, therefore did not meet the prescription, however 20% cut less than every three years and 27% did not cut. In addition, 7% cut banks outside the prescribed period, although for one fifth of holdings it was not clear whether they were cutting outside the period. Ditches were often cleaned out too frequently (15%) at an inappropriate time of year (23%) and dredging were spread on the bank (22%).

Buffer strips

72. Most (82%) arable buffer strips were established specifically for ES and around half of were established by natural regeneration. Of strips that were sown, one third of farmers included wildflower seed in the mix. Over 80% of farmers cut buffer strips, but, of those that were cut, half were apparently cut more frequently that stipulated. Timing of cutting is only stipulated for EE3 and EE9, but half of all arable buffers were cut in the bird breeding season. Although two thirds of farmers created biologically beneficial heterogeneity by cutting only part of the buffer strip, however most left cuttings in situ.

73. Most of the 6 m buffer strips recorded as EE3 or EE6 were adjacent to a watercourse and should have been entered as the new EE9 and EE10 options.

74. Forty percent of buffers on intensive grassland options apparently had fertiliser applied, therefore these areas did not follow the prescription. In addition, three farmers (10%) were managing the buffer strips in the same way as the rest of the field. This suggests that either fertiliser was being applied (although one farm was organic) or that the buffers were around fields that did not receive fertiliser, which would not be eligible as ‘intensive grassland’. A significant minority (15%) were cutting for hay or silage which is not allowed under the prescription. Around one third of farmers were applying herbicides to buffers, but these were largely selective and applied as spot treatment, although a small number were using herbicides to control non-injurious weeds.

Field corners and sown mixtures

75. Three quarters of EF1 field corners were cut and of these nearly two thirds were cut more frequently than the prescription allows and nearly half were cut within the prohibited time.

76. One quarter of wild bird seed mixtures (EF2) were not sown with a sufficient number of small-seeded species to meet the prescription. Similarly, one third of nectar flower mixtures (EF4) were sown with fewer nectar-rich plant species than stipulated (4 species). Most (82%) nectar mixes were not cut annually and therefore did not meet the requirements of the option and at least one third were not cut during the specified period. Only a small number of farms rotated these two mixes around the holding and a significant minority (13/14%) did not re-establish the mixes frequently enough to meet the requirements.

Overwintered stubbles

77. Straw was removed from most overwintered stubbles (EF6) and only a small proportion of stubbles were cultivated after harvest. However, pre-harvest desiccants and/or post-harvest herbicides were applied, against prescription, on 22% of farms. All farms with this option met the requirement to maintain the stubble until 15 February.

Low input grasslands

78. Fields in EK2/3 were predominantly grazed fields (55% and 63% respectively were never cut for hay/silage). Only a very small number of farms were applying fertiliser in excess of the prescriptions. Nearly half the features received herbicide applications but these were generally selective spot treatment applications, although nettles were a common target. Rolling and/or harrowing was undertaken outside the prescribed time (i.e. during April/May and June for EK3) on 19% of farms with EK2 and 10% of EK3. Supplementary feeding was carried out on 9% of EK3 features, against the prescription.

Comparison of field attributes for features in and out of scheme

79. Within-farm controls (features outside the scheme) were assessed for appropriate options including hedges, ditches, hedge/ditch combinations, stone walls, in-field trees (on arable and grassland), woodland edges and grassland, and compared with features within scheme options on the same farm. Some features were also assessed on farms that were not participating in the scheme and compared with those on farms within the scheme.

ELS hedges v. in-farm controls

80. Enhanced hedges, EB3, were significantly taller than in-farm control hedges. ELS hedges had, on average, a lower proportion of gaps than in-farm controls (significant for EB2 and EB3). The width of the uncultivated strip next to ELS hedges was wider than for in-farm controls (significantly so for EB2). There was a higher proportion of insect-pollinated plants in the uncultivated strips next to ELS hedges compared with the control hedges (significant for EB2).

ELS hedges v. NP

81. The EB3 enhanced hedges were significantly higher and wider than the NP control and EB1 hedges; there was not a significant difference between the control hedges and EB1 or EB2. The control hedges on non-participant farms had, on average, a greater cover of flowers and fruits than the EB1 and EB2 hedges but less than the EB3. The significant difference was between the EB3 and EB1 & 2 hedges. There was a significant difference

in the cover of bramble between the EB1 hedges (lowest) and the EB2 hedges (highest) with the control hedges and EB3 falling in-between. EB3 and non-participant hedges were more likely to be judged as 'old' compared to EB1/2 features.

82. The uncultivated strips adjacent to hedges were on average narrower on the non-participant farms than on ELS farms with a statistically significant difference between the NP controls and EB2, which was the option with widest strips. Analysis of different vegetation components of the adjacent strip indicated that strips adjacent to EB3 hedges had highest proportions of annual species cover and non-participant features had lowest annual species cover. Percent cover of woody species was low, but was greater on strips adjacent to EB2.

83. There were no significant differences between ELS and NP control ditches.

Hedge-ditch combinations

84. The EB9 and EB10 hedges were significantly higher than the NP control and EB8 hedges. The uncultivated strip adjacent to EB10 hedges was significantly narrower than for the other hedge groups.

In-field trees in grassland: ELS v. NP

85. The management of in-field trees in grass fields did not differ significantly between ELS and non-participant control farms, but there was a difference in the age distribution with more mature trees and fewer veteran trees on ELS farms than on the NP farms.

Buffer strips in arable fields

86. The average width of ELS strips was wider than the prescribed width, while the average width for buffers on NP farms was over 5 m. Three-quarters of the control buffers showed some signs of compaction compared with half of the ELS buffers. There was only one instance of severe compaction recorded which was on a control strip.

Low-input grasslands

87. The EK3 grasslands had a higher average proportion of sward over 7 cm compared to the in-farm control grasslands, suggesting that they were more lightly grazed. There were no significant differences between ELS grasslands and non-participant controls. In this case, there was a significant difference between EK2 and EK3 grasslands for species number and sward height but the controls means fell between the two ELS options.

Detailed Grassland Assessments

88. Mean sward height was greater on fields in EK3 compared to those in EK2 and was greater in July than in May or October. Within-field variability in height was also significantly greater on fields in EK3 than those in EK2. Within-field variability was significantly different between months for three quarters of fields and variability was most frequently greatest in July.

89. The requirement to maintain a sward with a range of heights, with at least 20% shorter and at least 20% taller than 7 cm was met on fewer than half the fields at each assessment date. Fewest fields met these requirements in July and fields in EK3 were less likely to meet the requirements than those in EK2. However, when all three sample dates were considered for a field, two thirds of fields met these requirements at least once and 13% did so on all three sampling occasions. When swards were insufficiently

variable in height they were overwhelmingly too tall for the requirements, with only two fields (both EK2 sampled in October) too short.

90. Ground cover of individual injurious species was low, but as a group these species accounted for 5% and 9% of cover on EK2 and EK3 fields respectively. Creeping thistle was the most common injurious species.

91. The number of seed heads present in July was highly variable between fields (1.5 m^{-2} to 624 m^{-2}) but the mean was higher on EK3 (187) compared to EK2 (109). Taller swards supported higher seed head densities.

DISCUSSION

Farmer attitudes to the scheme

Environmental impacts

92. Farmers were more positive about the environmental benefits of the ES scheme in 2011/12 than at the launch of ES and the scheme itself had been instrumental in raising overall awareness of environmental issues.

93. In general, farmers were more positive about ES in 2011/12. Either improvements to the administration had been made, or farmers were more familiar with the processes. Some issues associated with management of specific features remain.

94. Farmers thought the scheme was most beneficial to farmland wildlife followed by water quality/soil protection, however resource protection was considered the most important environmental issue affecting agricultural land. This suggests that there is scope to encourage farmers to include options that benefit resource protection in future.

95. ES was considered more beneficial at a national scale compared to individual farms, particularly for historic options, perhaps reflecting the relative frequency of these features at the farm level. Current agreements were viewed slightly more positively than previous agreements, suggesting that farmers are better informed.

Impact of ES

96. Most farmers thought that the payment rate would cover their costs and the points allocation for individual options was generally considered appropriate, although dependent on variables such as grain prices. Points allocations were generally considered too low where land was taken out of production or to encourage greater uptake for certain options. Changes in points allocation introduced in 2013 may affect farmers' perceptions.

97. Buffers and arable options were most likely to have a negative effect on the farm business, presumably because these options require land to be taken out of production.

98. More than half of farmers surveyed were undertaking conservation work outside an agri-environment scheme (including non-participants). This voluntary management was usually not part of the ES and increases on phase 1 farms during the life of agreement suggest that farmers may be resuming activities formerly undertaken as part of the Countryside Stewardship Scheme.

Advice

99. Farmers were apparently more familiar with the scheme at renewal and fewer sought advice than had for their original agreement. Farmers were most likely to need advice for historic and landscape options which they are less familiar with. Although there were

few apparent differences between ETIP and non-ETIP groups this was a small sample of farms. More option specific advice was received on ETIP farms and ETIP provided an easily accessible route for quality advice.

Management change

100. When questioned in general terms, farmers suggested that there was little additionality associated with ES and that they selected options that required least change in management. However, when detailed management questions were asked and comparisons are made with similar features not in the scheme, the degree of change in management is greater than the answers to the general questions implied, particularly for arable options and buffer strips.

Quality of agreements and implementation

101. There were no significant differences in weighted scores between agreements within or outside priority areas for any of the environmental themes examined, indicating that the quality of agreements was similar within and outside priority areas'.

102. Where differences occurred between farms that had, or had not, received ETIP advice (for 'butterflies, bees and vulnerable grassland' and ''ground water' themes), those that had not received advice had the higher scores, as a result of higher uptake of certain key options on these farms. Comparison with a larger study of the impact of ETIP advice suggests that these results may be artefacts arising because the small sample visited in this study was not sufficiently representative of the whole population in this regard. Nevertheless, the evidence from both studies is that the effect of ETIP so far has been small.

Management of specific habitats

103. A significant minority of farmers failed to meet many elements of option prescriptions, probably a result of ignorance of, or an unwillingness to comply with, certain requirements (e.g. in-field trees – fallen wood removed, cultivation under the canopy; buffer strips – cut too frequently). The presence of EE3/6 adjacent to watercourses suggests that farmers were not fully cognisant of recent changes to the scheme.

104. Hedges on many farms are cut less frequently under ES options. Although many farmers are concerned about rotational cutting, relatively few dropped hedgerow options for their new agreement. The option management had a positive impact on height and width of hedges during the first agreement, however hedges on non-participant farms were similar to those under EB1 and EB2, suggesting little impact of management except under EB3.

105. There were no differences between option and NP ditches, however a significant minority were not cleaned out according to prescriptions and most of the attributes analysed would not be expected to change over only a few years.

106. The value of low input grassland prescriptions was maintenance of existing low input management particularly for EK3, with farmers selecting historically less intensively managed fields for these options. Guidance on maintaining a varied sward structure to benefit invertebrates was not always observed and swards were almost always too tall, therefore the benefits to birds may be limited.

Conclusions

107. In general, agreement holders were happy with the scheme, and there was evidence of increasing recognition of environmental benefits over the first five years of Entry Level

Stewardship. There was some question concerning the level of additionality achieved, however option-specific questions at interview and field results indicated that levels of change were greater than apparent from answers to more general questions asked in interviews with agreement holders.

108. Certain prescriptions were often not implemented correctly. It is suggested that, in addition to increasing the impact of ETIP on choice of options, there is scope for introducing advice on option location and management to improve compliance with prescriptions and resulting environmental value.

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1 INTRODUCTION

Entry Level Stewardship (ELS) and its organic equivalent, Organic Entry Level Stewardship (OELS) provide support to farmers and landowners in England for management to achieve a basic level of environmental benefits on agricultural land above those resulting from SPS cross-compliance measures, within the Environmental Stewardship (ES) scheme, which also includes Uplands Entry Level Stewardship to provide additional support in the uplands, and Higher Level Stewardship (HLS), designed to support higher levels of environmental management on land of greater environmental value.

The European Commission requires evidence of the effectiveness of agri-environment schemes to be produced in line with the Common Monitoring and Evaluation Framework (CMEF). This framework uses a set of indicators to measure the direct and immediate effects of the intervention (result indicators) and the wider benefits of the programme beyond this, expressed in "net" terms (impact indicators). The result indicator for Environmental Stewardship (Measure 214) is defined as 'the area under successful land management (successful completion of land management actions) contributing to biodiversity and high nature value farming/forestry; water quality; mitigating climate change; soil quality and avoidance of marginalisation and land abandonment'. The mid-term evaluation of RDPE (Hyder/ADAS, 2011) stated that there is an urgent need to better define success at agreement and aggregate level. This contract was commissioned by Natural England in July 2011 in order to evaluate:

- the 'success' of management under agreements established in the first two years of the scheme ('Phase 1');
- the potential of the second round ('Phase 2') of (O)ELS agreements post-renewal to deliver a higher level of environmental benefits, and to meet the targets set out for ELS in 2010 by Defra and Natural England.
- The role of the 'Enhanced Training and Information Programme' (ETIP), launched in 2010 to support (O)ELS and UELS[4] applicants, in enhancing the outcomes of 'Phase 2' ELS.

The remit of this project is confined to the impacts of ELS and OELS. UELS is the subject of a separate evaluation let at the same time. The monitoring programme ran over two years, with the first year devoted to monitoring Phase 1 agreements and the second year to Phase 2 agreements.

An initial evaluation of Environmental Stewardship was carried out during its first two years of operation (Defra project MA1028; Boatman *et al*., 2007). Part of the project involved establishing baseline measures of features entered into Entry Level Stewardship (ELS) and Organic Entry Level Stewardship (OELS) options, with a view to the possibility of repeat measures being undertaken at some point in the future. As the first (O)ELS agreements expired in 2010, the current project includes a follow-up survey, both to learn from the experience obtained during the first phase of agreements, and to compare these with new Phase 2 agreements.

[4] Uplands Entry Level Stewardship.

2 METHODOLOGY

2.1 Project structure

The project was composed of four modules:

Module 1. Questionnaire survey of participants with 'Phase 1' agreements.

Interviews with 90 agreement holders in summer/autumn 2011, from among those previously visited in the initial evaluation in 2005-6 (MA01028), to obtain information on changes in attitudes and management practices since the launch of ES.

Module 2. Field survey of farms with 'Phase 1' agreements.

A field survey of Phase 1 agreements held by those interviewed in module 1, carried out in summer/autumn 2011 in parallel with the questionnaire survey, to provide evidence on changes since the 2005/6 baseline and quality of habitats/features managed under agreements.

Module 3. Questionnaire survey of participants with 'Phase 2' agreements.

This survey targeted farmers renewing ELS and OELS agreements in 2010/11, including those that have and those that have not received ETIP advice. It was carried out in winter/ spring 2012, and included agreement holders that were sampled in the initial evaluation, and for which baseline data were available, plus additional agreement holders not included in the original sample. The survey obtained information on option selection, placement and management, and factors influencing it, in agreements from 2010 onwards.

Module 4. Field survey of farms with 'Phase 2' agreements

A field survey of the condition and placement of features being managed under agreements included in Module 3 was carried out during summer 2012. The survey provided evidence on the likely quality of habitat and feature management, and effectiveness of (O)ELS from 2010 onwards, in terms of target delivery.

Thus modules 1 (questionnaire survey) and 2 (field survey) together will provide the evidence to assess Phase 1 agreements, whilst modules 3 (second questionnaire survey) and 4 (second field survey) will provide the evidence to assess the likely benefits of agreements between 2010 and 2015, and the effect of ETIP in influencing these benefits. This report describes results from Phase 2 interviews (module 3) and Phase 2 fieldwork (module 4).

The way in which the outputs of these modules will be used to provide the evidence requirements listed in the project specification is summarised in Table 1.

Table 1. Monitoring aims and sources of evidence.

Evidence requirement	Sources of evidence	Module
Environmental benefits provided by a sample of 'Phase1' O/ELS agreements established in 2005/6, through field assessments of the 'condition' of options being delivered.	Field re-survey of options assessed during the baseline survey carried out in the initial evaluation of ES 2005-6 (MA01028). This will be linked to management information obtained during the farmer interview survey at (3) below.	2
Environmental benefits provided by a sample of 'Phase2' O/ELS renewals from 2010, through an initial assessment of option selection, condition and placement.	Farmer interviews to determine intentions for selection and management of options (see (4) below), linked to a field survey of options under new agreements to determine initial condition and whether placement is appropriate.	4
Whether participation in ELS or OELS so far has had a positive impact on farmer attitudes to environmental issues and the role of ELS and OELS options in addressing them, relative to the baseline;	Re-survey of agreement holders who took part in the initial evaluation, with questions designed to facilitate measurement of change through comparison with the participant survey in the initial evaluation.	1
Farmer intentions in respect of renewal of the ELS and OELS agreement, exploring attitudes and factors affecting option choice, before and after advice via ETIP, across a range of farm types;	Farmer attitude survey of those renewing agreements, stratified by ELS/OELS and those who have and have not received ETIP advice. This will include some agreement holders from the initial evaluation, to enable analysis of change in attitudes.	3
The quality of option delivery, including option condition and location/placement, being provided by the renewed 'Phase 2'ELS and OELS agreements in comparison to the initial agreement;	Comparison of interview responses and field assessment data for Phase 1 and Phase 2 agreements (including 2005/6 baseline data, where available), in relation to targets for the area concerned under the relevant themes (as identified in the project specification).	4
The role of ETIP in influencing option placement and management in renewed agreements;	Comparison of interview responses and field assessment data from participants who have received ETIP advice and those that have not.	3
Potential effectiveness of O/U/ELS from 2010-15 in relation to the targets being set by Defra and Natural England.	Scaling up of interview responses and field assessment data from Phase 2 agreements and comparison with Defra/NE targets at appropriate spatial level.	3/4

2.2 Data collection

Data collection methods were developed taking account of comments from Natural England and a Defra statistician. Survey questionnaires and letters to accompany postal questionnaires were submitted to the Defra Survey Control Liaison Unit for final approval, which was received after minor changes were made.

2.2.1 Supporting data

Data for the 180 agreements on which baseline assessments were carried out in 2005/6 were supplied by Natural England, giving details of options selected in the original agreement and the new agreement (if renewed). Original agreement maps were available to the survey team from the 2005/6 evaluation, annotated to identify features that were surveyed during field work. Agreement maps for renewed agreements were requested from Natural England where the agreement holder responded positively to the postal questionnaire, indicating a willingness to take part in an interview and host a field visit. Current agreement maps for those farms not assessed in 2005/6 were also provided by Natural England.

2.2.2 Postal questionnaire

A postal questionnaire was sent to all farms that took part in the baseline survey carried out as part of the 2005/6 evaluation of the operation of ES (Phase 1). This questionnaire was also sent to a sample of farms that: i) had received ETIP advice, ii) those that had not and iii) holdings for which data relating to ETIP advice was not available (Phase 2). A shorter questionnaire was sent to a sample of farmers without an agri-environment agreement (Non-participants). These had two aims:

(i) to identify those who would be prepared to be interviewed and accommodate field survey;

(ii) to collect basic information about the farm, the (O)ELS agreement, advice received, and farmers' attitudes to the scheme.

In addition, the questionnaire was also sent to those who had responded to the postal questionnaire in the 2005-6 evaluation, to provide an increased sample size for comparison with the earlier survey. The form and accompanying letter for this group were modified to remove the request for an interview and field survey.

The questionnaires and accompanying letters are reproduced in Annex 1. Many of the questions were similar to those asked in the original (2005/6) survey, to allow comparisons where these were considered to be of interest. Additional questions were inserted asking for information about advice and support received for new (Phase 2) agreements, as this was a key element of the current project.

2.2.3 Interview questionnaire

Respondents with an ES agreement who indicated that they would be willing to be interviewed were contacted by telephone to arrange a mutually convenient date and time. Questions were divided into two types: generic questions, which were asked for all options,

and specific questions, that varied between options and referred to particular management issues associated with that option (or option group where options are similar). Interview questions are reproduced in Annex 1.

In order to minimise costs and burden on agreement holders, questions relating to renewed (Phase 2) agreements were asked during the same interview as questions on Phase 1 agreements for those farms that were included in the 2005/6 baseline assessment and did not have HLS agreements. Where farms are in HLS, the agreement is for ten years so they were not considered appropriate for Phase 2 assessment.

Interviews were carried out with 160 farmers, 120 of which had renewed their ELS agreements. Natural England provided the ETIP status for 114 of these; 60 had been through the ETIP process and 54 were classified as Non-ETIP. An additional 40 farmers were interviewed who were identified by Natural England as having new agreements, for which ETIP information was not available.

Both postal and interview questionnaires, were a combination of tick box category questions and free text responses. Not all farmers answered all questions (free text responses in particular). Results are presented as percentage data except where sample sizes are very small. Where percentage results are reported, figures represent the percentage of those that responded to each individual question.

Free-text responses were assigned a category. This was an iterative process, with answers grouped according to their similarities, and category designations evolving as further answers were added. If an answer did not fit an existing grouping, a new category would be created, resulting in an increase in the number of categories as the process continued. In many cases answers clearly fell into a particular broad category, but a significant number of responses were either too exclusive or too vague to be grouped into a single defined category. These were put into a diverse category under the titled 'Other'.

2.2.4 Field data collection

Programmes of option assessment in the field were carried out for Phase 1 and 2 of the study to record characteristics of the habitats or features being managed through ELS or OELS options that indicate the choices being made and whether the management is likely to achieve the intended environmental benefits.

Similar characteristics to those recorded in the original 2005/6 baseline survey were recorded, where appropriate, to allow for analysis of change during the life of the agreement. Some additional items were also recorded for some options. For example, hedgerow condition was assessed according to standards specified in the Hedgerow Survey Handbook (HSH) (Defra 2007), to define hedges in favourable condition according to definitions used in the HSH, and vegetation height was recorded for grassland options.

Attributes recorded for each option/feature are summarised in Annex 1 in two tables, the first listing attributes relating to management of the feature, and the second concerned with feature condition. The boundary between these two categories is not always clear, as most aspects of condition relate to management at some point in time, but the first table deals primarily with management specified in the option prescription. Attributes recorded for the first time in 2011 are identified in the tables by italic text.

Comparisons between features in the scheme and those outside can be used to indicate differences between management and habitat characteristics associated with inclusion in the scheme. For certain feature types, which were likely to be found both as part of an ES agreement and outside agreement on an individual farm, features in agreement and control features not in agreement were assessed. Control features assessed on agreement farms were: hedges, ditches, hedge/ditch combinations, stone walls, in-field trees (on arable and grassland), woodland edges and grassland. On each farm three features under each option were assessed (or fewer if insufficient replicates were present). Control features were only assessed on agreement farms where the number of control features available matched the number of features assessed in agreement.

A sample of 40 non-participant farms was also visited in order to compare option features with similar features not in agreement. Feature types assessed on non-participant farms were:

Nectar flower mix
Wild bird seed mix
Rush pastures
Grassland
Buffers next to watercourses on arable land
Buffers next to watercourses on grassland
Stone walls
Woodland edges
In-field trees on arable land
In-field trees on grassland
Buffer strips on grassland
Buffer strips on arable land
Field corners on arable land
Hedge/ditch combinations
Ditches
Hedges

On each non-participant farm, up to seven feature types were assessed, selected in order presented here.

2.2.4.1 Detailed grassland assessments

On a subset of 40 farms with either EK2 or EK3 options, more detailed grassland assessments were conducted on three occasions (May, July and October) primarily to assess whether farmers were creating a variable sward attractive to invertebrates and birds through grazing management. For these assessments, fields were selected at random from those that the farmer indicated would not be cut for hay or silage, but which would be grazed. Where both options were present, detailed assessments were made on one field of each option (total of 51 fields). At each assessment, 40 sward height measurements were made using a HFRO sward stick. In addition, during the July visit, assessments of cover of injurious weeds and seed head numbers were made.

2.2.4.2 Data capture

Data were captured electronically using 'toughbook' hand held computers designed for field data recording, and pre-programmed with field data sheets in Excel. This was found to be more appropriate for the type of data being collected than the alternative GIS-based system; however the resulting data can easily be converted to GIS format by using the spatial identifiers recorded with the data. Electronic field sheets were tested prior to the start of field surveying, and a number of changes were made to ensure correct operation. The toughbooks incorporate digital cameras, and surveyors were requested to take photographs of the features assessed to illustrate points of interest.

2.2.5 Analysis

Analyses of Phase 1 data concentrated on two aspects; comparison of data from postal questionnaires, interviews and field surveys between 2005/6 and 2011, and comparisons between field survey data from features within ELS options and control features collected in 2011. Sample sizes were only sufficient to permit analysis for a limited number of options: field boundary options (hedgerows, ditches, stone walls), in-field trees and woodland fences, and certain grassland options.

Phase two analyses were carried out at option level and at agreement level. Agreement level analyses were carried out for environmental themes defined by Natural England[5] to investigate the effect of location of the farm in question (within or outside a priority area) and whether or not the agreement holder had received advice through the ETIP programme. Analyses were performed on scores applied to priority options for each environmental theme which were weighted by the proportion of agreement points devoted to that option. The weighted scores were then summed for all priority options relevant to the theme in question for each agreement.

Analyses of generic interview questions focussed on differences between farmers that had received ETIP advice and those that had not.

Two comparisons were made for the field data at option level. Features in agreement were compared with features on the same farm that were not in agreement. In addition, features in agreement were compared with similar features on non-participant farms. Sample sizes were only sufficient to permit analysis for a limited number of options. Data are presented as percentages throughout, however for some fields within tables the number of replicates is low. Actual numbers are therefore also presented to allow interpretation of the percentage data.

Further details of specific analyses carried out are described in the appropriate section of the results.

[5] www.naturalengland.org.uk/Images/els-priority-options_tcm6-34471.pdf.

3 RESULTS – PHASE 1

In 2011/12, agreement holders that had been part of the original 2005 evaluation were resurveyed through a postal questionnaire and, for a subset of respondents, a visit interview. Questions were designed to measure change in attitudes or management, in comparison with the baseline survey to assess whether participation in ES had had a positive impact on farmer attitudes to environmental issues and the management of features.

3.1 Postal questionnaire

In total, 297 responses were received to the postal questionnaire. Of these, 100 were from the original baseline sample. Visits were made to 90 of these, to carry out interviews.

Only respondents who gave an answer to similar questions in both 2005 and 2011 were included in the analysis, thus allowing a direct comparison of responses and changes over time. In some cases there were slight changes to the wording of questions in 2011 because the wording used in 2005 would not have been appropriate. The actual wording used in the two questionnaires is therefore shown for each comparison made to provide the context for the comparisons.

Some interview questions resulted in categorical ('tick box') answers and these are reported first. Answers to open questions resulting in free text answers are presented subsequently.

3.1.1 Questions with categorical ('tick-box') answers

3.1.1.1 National objectives of scheme.

Q42 (2005) what do you believe ELS will contribute to the following objectives: Improving water quality and reducing soil erosion, improving conditions for farmland wildlife, maintaining and enhancing landscape character, protecting the historic environment;

Q10 (2011) What do you regard as the most important objectives of (O)ELS nationally: improving water quality and reducing soil erosion, improving conditions for farmland wildlife, maintaining and enhancing landscape character, protecting the historic environment, mitigating climate change impacts?

Table 2. Contribution/importance of ELS to meeting national objectives.

Objective	n	2005			2011		
		Nothing	Very little	Very important	No importance	Some importance	Very important
Improving water quality and reducing soil erosion	47	4.3	34.0	61.7	6.4	36.2	57.4
Improving conditions for farmland wildlife	49	2.0	24.5	73.5	0.0	8.2	91.8
Maintaining and enhancing landscape character	50	2.0	28.0	70.0	2.0	42.0	56.0
Protecting the historic environment	47	0.0	40.4	59.6	4.3	57.4	38.3
Mitigating climate change impacts	84	-	-	-	28.6	42.9	28.6

In both 2005 and 2011, improving conditions for farmland wildlife was perceived as being the most important national objective of ELS; over 70% of respondents who chose this objective felt that it was very important (Table 2). This proportion increased to over 90% by 2011.

For achieving the other national objectives for resource protection, landscape and the historic environment, ELS was apparently seen to be of less importance in 2011, with small increases in the percentages of those feeling the scheme was of 'no' or 'some importance' compared to 2005, and reductions in the percentages considering them to be very important. Mitigating climate change impacts was only listed as a national objective of ELS in 2011, with an equal proportion of famers stating that the scheme was of 'no importance' and 'very important' (28.6%).

In addition, one respondent in 2005 had answered 'not known' against all four national objectives listed. However, in 2011 three were perceived to be 'very important' whilst the scheme was seen as of 'some importance' for improving water quality.

In order to give a clearer comparison of the degree of change in perception of the importance of ELS to meeting national objectives, the three categories of answer were given a value based on the level of contribution/importance. Thus the answers 'Nothing' and 'No importance' were scored as '1', 'Very little' and 'Some importance' = 2, and 'Very important' = 3. For each response, the difference in scores between the two questionnaires was calculated to give a result between -2 (indicating that the perceived contribution/importance had gone down by two categories, - and +2 (the perceived contribution/importance had increased by two categories.

Table 3. Level of perceived change in contribution/importance of the national ELS objectives.

	n	-2	-1	0	+1	+2
Improving water quality and reducing soil erosion	47	1	13	21	12	0
Improving conditions for farmland wildlife	49	0	3	34	11	1
Maintaining and enhancing landscape character	50	1	11	32	6	0
Protecting the historic environment	47	0	14	31	2	0
Mitigating climate change impacts	84	*	*	*	*	*

For most of the national objectives the majority of respondents had not changed their opinion of the importance of ELS (about 65% of respondents) (Table 3). The greatest increases in perceived importance were for 'improving water quality and reducing soil erosion' (25.5%) and 'improving conditions for farmland wildlife' (24.5%). However, similar numbers of respondents considered that the soil and water objective was less important in 2011 than 2005. More respondents ascribed lower importance to 'maintaining and enhancing landscape character' and 'protecting the historic environment' in 2011 compared to 2005, than through they had greater importance.

3.1.1.2 Impact of the Scheme on individual farms.

Q41 (2005) On your farm and in your opinion how important will your chosen options be for: improving water quality and reducing soil erosion, improving conditions for farmland wildlife, maintaining and enhancing landscape character, protecting the environment;

Q13 (2011) How effective do you think your (O)ELS was for: improving water quality and reducing soil erosion, improving conditions for farmland wildlife, maintaining and enhancing landscape character, protecting the environment, mitigating climate change impacts?

In 2005, chosen options were perceived as being of greatest importance on individual farms for 'improving conditions for farmland wildlife' and 'maintaining and enhancing landscape character' (Table 4). However, the percentage who thought options were very effective for wildlife increased between the two surveys, while it reduced for landscape. A third of respondents perceived that their chosen options would be of no use for improving water quality and reducing soil erosion and protecting the historic environment in the baseline survey; this perception still existed in 2011. However, in 2011 a similar proportion reported that they felt that their options were very effective at improving water quality and reducing soil erosion on their holding. The percentage of respondents who thought that options would be very effective for improving water quality and reducing soil erosion increased between 2005 and 2011 by nearly 10%.

Again, 'Mitigating climate change impacts' was only included on the 2011 questionnaire, but over half of respondents felt that their chosen options would not be effective in helping to meet this objective.

Table 4. Importance/effectiveness of chosen options in meeting the scheme objectives on the holding.

	n	2005			2011		
		Of no use	Some use	Very important	Not effective	Quite effective	Very effective
Improving water quality and reducing soil erosion	41	34.1	43.9	22.0	29.3	39.0	31.7
Improving conditions for farmland wildlife	47	6.4	34.0	59.6	2.1	29.8	68.1
Maintaining and enhancing landscape character	42	7.1	28.6	64.3	9.5	35.7	54.8
Protecting the historic environment	41	31.7	39.0	29.3	29.3	43.9	26.8
Mitigating climate change impacts	50	-	-	-	54.0	30.0	16

Again, categories of response where given a numerical recoding and the difference between the two questionnaires calculated. Overall, improving conditions for farmland wildlife and maintaining and enhancing landscape character had the highest proportions of respondents who did not change their opinion on the importance of their chosen options to meeting the scheme objectives (approx. 55%) (Table 5). Only 42% of respondents had the same opinion on the other two objectives, though both showed the highest proportions of respondents whose opinion had improved slightly (30% for +1). However, 26% of respondents also felt that their options were less likely to be effective for protecting the historic environment.

Table 5. Level of perceived change in importance/effectiveness of chosen options to ELS objectives.

	n	-2	-1	0	+1	+2
Improving water quality and reducing soil erosion	41	0	9	18	13	1
Improving conditions for farmland wildlife	47	0	8	26	10	3
Maintaining and enhancing landscape character	42	1	10	24	7	0
Protecting the historic environment	41	1	11	17	11	1
Mitigating climate change impacts	50	*	*	*	*	*

3.1.1.3 Payment rates.

Q44 (2005) Do you think the cost of implementation of the scheme on your farm will be covered by the payment rate?

Q17 (2011) Do you think the cost of implementation of the scheme on your farm was covered by the payment rate?

Before entering the ELS, over 60% of respondents felt that the payment rates would cover the costs of option management on their farm. This proportion had increased to almost 75% at the time of their new agreement in 2011. However, the proportion of those who felt that their costs would not be covered had also increased to about 25%.

Table 6. Payment rates and coverage of costs.

n	2005			2011		
	Not known %	Yes %	No %	Not known %	Yes %	No %
81	27.2	61.7	11.1	1.2	74.1	24.7

In 2005, 22 respondents reported that they did not know whether their costs would be covered by the scheme payment rate. By 2011, 10 had changed their response to a 'no' and 12 to 'yes'. The one 'not known' in 2011 had previously answered 'no' to the question. Only seven respondents who said 'yes' in 2005 had changed their answer to a negative one in 2011.

3.1.1.4 Points allocations.

Q47b (2005), Q19 (2011) Are there any options where you feel the points allocations are either generous or too low?

Only 20 responses to this question were received and no respondent answered in both 2005 and 2011. In 2005 there were 13 responses, each for a different option (EB1, 2, 3, 11, EC1, EE7, EK2, OB1, OB2, OB11, OK2, OL1, OL2). In 2011 there were seven responses (EB1, 11, ED1, EF1, EK5, EL2, 3). In all cases the points allocation was listed as too low. However in 2011, an additional single respondent noted that the points allocation was too high for two options, but failed to record which options they were referring to.

3.1.1.5 Advice and Support.

This section considers advice received for original agreements, starting in 2005/6 and new agreements. In order to ensure comparability and relevance with respect to changes in advice provision, questions were asked in the 2011 questionnaire about advice received for both agreements, and these are compared here. Because numbers responding in certain categories are low, tables present actual numbers rather than percentages in this section. Responses to these questions were analysed at the population level rather than comparing responses at the farm level.

Q15a (2011) Did you receive one-to-one advice during your original (O)ELS agreement on: option choice and option management.

Q15c (2011) Did you receive one-to-one advice on your new (O)ELS agreement on option choice and option management.

Overall 56 and 57 farmers gave information on option choice and option management advice respectively in either 2005, 2011 or in both years. A larger number of farmers had received one to one advice for their original agreement than their new agreement regarding both option choice (Table 7) and option management (Table 8).

Overall, two thirds of advice provided was considered to be very useful for both option choice (77% in 2005; 76% in 2011) and option management (67% in 2005; 76% in 2011) although fewer farmers sought advice in 2011. Only a very small number of farmers had not found the advice they had received useful, all of which related to advice received in 2005 (2 for option choice and 3 for option management).

Two thirds of advice mentioned had been delivered by Natural England (NE) or the Farming and Wildlife Advisory Group (FWAG) (between 65% and 68% for option choice and management in each year). Over half of those who had received advice from one or more organisations had received advice from NE. Fewer farmers had received advice from FWAG on their new compared to their original agreement. Generally, advice from NE and FWAG in both years on option choice and management was considered very useful (between 67% and 92%).

Table 7. Sources of advice for option choice for old and new agreements.*

Source of advice	Old agreement (no. of farms=52)				New agreement (no. of farms=32)			
	n	**Not useful**	**Quite useful**	**Very useful**	***n***	**Not useful**	**Quite useful**	**Very useful**
Other	*6*	1	2	3	*5*	0	1	4
ADAS	*2*	0	1	1	*0*	0	0	0
Land Agent	*6*	1	0	5	*5*	0	1	4
Agronomist	*2*	0	1	1	*0*	0	0	0
Natural England	*30*	0	7	23	*18*	0	4	14
Environment Agency	*3*	0	2	1	*0*	0	0	0
FWAG	*24*	0	2	22	*6*	0	2	4
Independent	*6*	0	1	5	*2*	0	1	1
Conservation group	*4*	0	1	3	*1*	0	0	1
Total	*83*	2	17	64	*37*	0	9	28

*Percentage not calculated due to low number of respondents for some groups. Data is based on responses from 56 farms that specified at least one source of advice and its value relating to the original, new agreement or both agreements.

Table 8. Sources of advice for option management for old and new agreements.*

Source of advice	Old agreement (n=55)				New agreement (n=32)			
	n	Not useful	Quite useful	Very useful	*n*	Not useful	Quite useful	Very useful
Other	*7*	1	2	4	*5*	0	1	4
ADAS	*2*	0	2	0	*0*	0	0	0
Land Agent	*6*	0	1	5	*4*	0	1	3
Agronomist	*1*	0	0	1	*0*	0	0	0
Natural England	*33*	1	9	23	*19*	0	4	15
Environment Agency	*3*	0	2	1	*0*	0	0	0
FWAG	*21*	0	5	16	*7*	0	2	5
Independent	*5*	0	2	3	*2*	0	1	1
Conservation group	*4*	1	1	2	*1*	0	0	1
Total	*82*	3	24	55	*38*	0	9	29

*Percentage not calculated due to low number of respondents for some groups. Data is based on responses from 57 farms that specified at least one source of advice and its value relating to the original, new agreement or both agreements.

Q15 b (2011) Did you get information from any other sources during your original (O)ELS agreement? If yes, please indicate how useful they were.

Q15 d (2011) Did you get information from any other sources during your new (O)ELS agreement? If yes, please indicate how useful they were.

Overall, other sources of information were considered to be less useful than one to one advice. Where other information was received by farmers, only 43-45% considered the information to be very useful for option choice; however, only around 5% thought that information received was not useful (Table 9). Similarly, 38-40% considered the information to be very useful for option management, and only 7-8% considered it not useful (Table 11).

In 2005, farmer meetings organised by Defra/NE and farm walks were the most common sources of advice, although the Defra/NE website was most likely to be considered a very useful source of information by those that used it for both option choice (58%) and management (54%). However websites were also most likely to be considered not useful by those that used them in 2005 (25% and 31%). In 2011, Defra/NE farm meetings, telephone advice from Defra/NE and farm walks were the most commonly used sources of information. Telephone advice from Defra/NE was most likely to be considered very useful by those who used it for both option choice (61%) and management (58%).

Table 9. Other sources of advice for option choice.*

Source of advice	Old agreement				New agreement			
	n	Not useful	Quite useful	Very useful	*n*	Not useful	Quite useful	Very useful
Farmer meetings (Defra/NE)	*33*	1	16	16	*15*	1	8	6
Farmer meetings (Other)	*0*							
Farm walks	*29*	0	18	11	*12*	0	7	5
Defra/NE website	*12*	3	2	7	*4*	1	2	1
Telephone advice from Defra/NE staff	*21*	2	11	8	*13*	1	4	8
Other telephone advice	*0*							
Written material (other than scheme handbooks)	*19*	1	12	6	*8*	0	4	4
Other advice	*20*	0	10	10	*3*	0	2	1

*Percentage not calculated due to low number of respondents

For the small number of farmers who reported receiving information from the same source in both 2005 and 2011, data for individual farms were analysed to determine if there were any differences in the value of this information for the original and new agreements. Overall there was little change in the value of other information received (Table 10 and Table 12).

Table 10. Levels of change in perceived usefulness of advice for option choice.

Source of advice	*n*	-2	-1	0	+1	+2
Farmer meetings (Defra/NE)	*11*	0	3	6	2	0
Farm walks	*10*	0	2	7	1	0
Defra/NE website	*4*	0	0	3	1	0
Telephone advice from Defra/NE staff	*6*	0	0	5	1	0
Written material (other than the scheme handbooks)	*5*	0	0	5	0	0
Other advice	*2*	0	0	2	0	0

Table 11. Other sources of advice for option management.*

Source of advice	Old agreement				New agreement			
	n	Not useful	Quite useful	Very useful	*n*	Not useful	Quite useful	Very useful
Farmer meetings (Defra/NE)	*28*	2	15	11	*10*	1	5	4
Farmer meetings (Other)								
Farm walks	*24*	0	16	8	*9*	0	5	4
Defra/NE website	*13*	4	2	7	*4*	1	2	1
Telephone advice from Defra/NE staff	*18*	3	8	7	*12*	1	4	7
Other telephone advice								
Written material (other than scheme handbooks)	*14*	0	10	4	*7*	0	5	2
Other advice	*20*	0	13	7	*3*	0	3	0

*Percentage not calculated due to low number of respondents

Table 12. Levels of change in perceived usefulness of advice for option management.

Source of advice	*n*	-2	-1	0	+1	+2
Farmer meetings (Defra/NE)	*8*	0	3	3	2	0
Farm walks	*8*	0	1	6	1	0
Defra/NE website	*4*	0	0	3	1	0
Telephone advice from Defra/NE staff	*5*	0	0	4	1	0
Written material (other than the scheme handbooks)	*3*	0	1	2	0	0
Other advice	*2*	0	0	2	0	0

3.1.2 Free text questions

Categorisation of free-text data

Several questions in both the 2005 and 2011 surveys called for free-text answers, and it was therefore necessary for all responses to be assigned a category. This was an iterative process, with answers grouped according to their similarities, and category designations evolving as further answers were added. If an answer did not fit an existing grouping, a new category would be created, resulting in an increase in the number of categories as the process continued. In many cases answers clearly fell into a particular broad category (e.g. 'benefit to wildlife/the environment' or 'financial incentive'), but a significant number of

responses were either too exclusive or too vague (e.g. the most positive aspects of (O)ELS?: “To be able to change and learn”) to be grouped into a single defined category, and these were put into a diverse category under the titled ‘Other’.

Clearly, categorisation of free text answers involves a degree of subjectivity. In order to ensure consistency, all the 2005 and 2011 data were categorised by the same researcher.

Once all the answers had been assigned to particular categories a further review was carried out and, where appropriate, categories were combined (and where necessary renamed) to provide a manageable number of distinct groupings. The advantage of categorising responses is that it allows comparisons to be made between diverse sets of data, thereby allowing inferences to be drawn, such as any changes that have taken place over time. A disadvantage is that a broad overview is gained by sacrificing individual details. To minimise the loss of useful information, any responses that were particularly interesting or informative have been quoted in the assessment below.

Statistical analysis

To determine whether there was any significant difference between the responses of the 90 agreement holders who were visited and the full 297 responses to the postal survey, chi-square testing was carried out for each free text question. Of the 11 questions, eight showed no significant difference between the categorised responses, one question indicated a borderline difference ($p = 0.07$), and one showed a significant difference ($p = 0.03$). Given that the majority of analyses showed no significant difference between the 90 and 297 agreement holders, the assessment below is based on the categorised responses of the 90 agreement holders. Where testing indicates a significant difference the areas in which the results of the two surveys differ are highlighted in the text. It should be noted that in a some cases agreement holders responded with more than one answer to each questions, hence the number of categorised responses often adds up to more than 90.

3.1.2.1 Approach to (O)ELS: most positive aspects of (O)ELS.

Q20 (2005); Q12a, (2011) in your opinion what are the most positive aspects of (O)ELS?

In both 2005 and 2011, agreement holders considered factors relating to ‘Wildlife conservation benefits’ to be the most positive aspect of the (O)ELS agreement (Table 13), equating to over 25% and 34% of responses respectively. Several agreement holders highlighted birds in particular as benefiting from changes in management practice derived from the agreement. In a similar vein, a number of agreement holders emphasized that the scheme actively encourages farmers to consider the issue of conservation. Although it is recognised that there is some cross-over between active consideration of the environment and ‘Wildlife conservation benefits’, such responses were judged to be sufficiently distinct to be assigned a separate category, namely ‘Encourages environmentally sustainable farming’. In 2011 the number of responses falling into this category was double that of 2005, although cross-referencing the holding numbers reveals that none of those who considered it of primary importance in 2005 chose it in 2011. However, some of these may have given a response in a related category, such as ‘wildlife conservation benefits’. Because the answers to free text questions are qualitative and contextual, it is therefore difficult to ascertain the extent to which respondents have altered their views.

The largest negative change was for the category 'flexible/easy to use scheme', for which the number of responses was reduced by two thirds. There was also a reduction in the numbers citing financial incentives.

The final column in Table 13 shows the number of holdings where the response that was provided fell into the same category for both surveys. So, for example, of the 37 agreement holders who considered wildlife conservation benefits as the most positive aspect of (O)ELS in the 2011 survey, 14 had given the same response in 2005.

In both 2005 and 2011 'Financial incentive' was considered to be the second most positive aspect of the(O)ELS, although in the more recent survey there was a slight drop in the number of agreement holders who specified this as a reason. Several respondents stated that the agreement provided payment for practices they were already carrying out. Of the 22 agreement holders who indicated financial incentive was important in 2005, only five still considered this the most positive aspect of (O)ELS in 2011. The 2005 survey determined that the flexibility or ease to use of the scheme ranked third in terms of positive aspects, making up 18 out of 110 responses (around 16% of responses). By 2011, however, this had dropped to just six responses out of 108 (less than 6% of responses), with just three of the original respondents considering this was the most positive aspect. These changes suggest that in 2011 there was a shift in focus among respondents from the logistics and financial rewards of the scheme towards the environmental benefits.

A number of agreement holders returned null responses (which are grouped along with 'none' and 'not known') for this question, perhaps indicating dissatisfaction with the scheme (suggesting they couldn't think of *any* positive aspects), although it is possible that they were generally satisfied with the scheme but couldn't narrow down their approval to just a single positive factor.

Table 13. Most positive aspects of (O)ELS.

Category	n (2005)	n (2011)	*'05 & '11 matches*
Wildlife conservation benefits	28	37	*14*
Financial incentive	22	17	*5*
Flexible/easy to use scheme	18	6	*3*
Null/none/not known	14	14	*3*
Supports organic/less intensive farming	6	3	*0*
Encourages environmentally sustainable farming	5	10	*0*
Greater efficiency/ better food/ positive change	5	1	*0*
Increased public awareness/ visits	3	3	*0*
Reduced use of pesticides/fertilisers	3	3	*0*
Improved boundary management	2	4	*0*
Other	2	7	*0*
Encourages maintenance	1	1	*0*
Protects watercourses	1	2	*0*
total	**110**	**108**	***25***

The category 'Other' contains a variety of responses, including observations that the agreement gave more security of tenure, encouraged new ways of thinking, and allows the measurement of improvements against a baseline.

3.1.2.2 Approach to (O)ELS: most negative aspects of (O)ELS.

Q20d (2005); Q12b (2011) in your opinion what are the most negative aspects of (O)ELS?

When asked to identify the most negative aspect of the (O)ELS, a large number of agreement holders cited excessive amounts of paperwork and form filling as the biggest drawback (Table 14). One such response was "massive complex paperwork". Other responses point to delays at the Rural Land Register and a lack of cooperation between Government bodies. Some describe the problem simply as "red tape", another stated that the scheme was "Launched with single farm payment [and] DEFRA struggled to cope with the workload"; all have been captured under the category 'Bureaucracy/paperwork/administrative issues'. Interestingly the number of respondents citing these types of issue declined from 28 in the 2005 survey to 11 in 2011, a reduction of some 61%. Of the original 28 respondents from 2005, only 4 still considered paperwork to be the most negative aspect of the scheme when questioned in 2011.

A large number of agreement holders gave no response when questioned as to the most negative aspect , making 'Null' the second largest category; when taken together with the "None" category, it could be interpreted as there being a high level of overall contentment with the scheme.

Table 14. Most negative aspects of (O)ELS.

Category	n (2005)	n (2011)	*'05 & '11 matches*
Bureaucracy/paperwork/administrative issues	28	11	*4*
Null	18	20	*7*
Restrictive/ inflexible rules	17	14	*5*
Other	13	14	*2*
None	12	17	*3*
Overly long contract	5	2	*0*
Reduced productivity	4	3	*0*
Financial disincentive	3	1	*0*
Hedge management issues	2	8	*1*
Untidiness	2	1	*0*
Difficult to achieve targets/target points	1	3	*1*
Payment timetable/issues	0	2	*0*
Weed problems	0	3	*0*
total	**105**	**99**	***23***

The third most common issue flagged up by agreement holders centres on the rules imposed by the scheme; thus for 2005 and 2011 the category 'Restrictive/ inflexible rules' makes up 16% and 14% of responses, respectively. Whilst some of the comments consist of general remarks, such as the rules being "too rigid to cover the diversity of farms around the country", and a "lack of tailoring to individual areas/requirements", much of the feedback is highly specific. Examples of specific negative aspects are that the scheme: "is too restrictive, particularly regarding ring feeders"; "does not recognise Lowland LFA as a special feature"; and "is not eligible on Government-owned land". One agreement holder stated that they required a scheme with uncomplicated dates and timings, so had tended to go for options already taking place on the farm, which (they regretfully pointed out) resulted in little gain for the environment.

Other categories of note include:

- 'Hedge management issues', which generally relates to more infrequent cutting, and includes a range of observations, such as livestock (generally sheep) getting caught up due to more disordered growth, hedges being more difficult to cut and wearing out machinery, and the assertion that infrequent cutting produces more open hedges which are less stock-proof and also provide less opportunity for small birds to nest. One agreement holder pointed to hedgerow management as an example of some aspects of the scheme that are too prescriptive rather than being outcome driven. The number of agreement holders flagging up hedge management as a negative aspect increased from two in 2005 to eight in 2011 (representing roughly 8% of respondents).
- 'Other', encompassing a range of issues, including an inspector contacting an agreement holder at an unsociable time (on a Sunday), movement of the moorland line (meaning that the agreement holder had to re-do the application), an increased level of vermin, compaction from supplementary feeding (1 response, 2005), cross-compliance (1, 2005), FER (1, 2005), low points allocation for LFA (1, 2005), mapping issues (1, 2005), the availability of online application/data entry (1, 2005), and a lack of public understanding (1, 2011). One respondent considered that the most negative aspect was that "the scheme seems to have very little policing and some people could get away with doing very little for the money", another that there were "no capital works in ELS" (both 2005).
- 'Untidiness' and 'Weed problems', the former relating to, for example, "unsightly areas of land that will become derelict" and hedge heights that make the farm look "scruffy"; the latter relating simply to "weed control". In 2005 no agreement holders reported problems with weeds as a significant negative aspect of the scheme, whilst in 2011 three respondents put these at the top of the list. Conversely, the number citing untidiness decreased from two respondents to one.

3.1.2.3 Difficulties experienced.

Q20e (2005); Q12c (2011). "Did you have any difficulties over the five year period of your original (O)ELS agreement arising from the scheme?

When agreement holders were asked to report any difficulties arising from the scheme over the five year period of their original (O)ELS agreement, the vast majority of respondents (74% in 2005 and 79% in 2010) stated that they had not experienced any difficulties (Table 15). Of those that had experienced problems, farm management restrictions and associated

issues (such as agreement holders experiencing difficulties meeting the scheme's requirements) were prominent, especially in relation to the 2011 survey. Such problems ranged from over-grown hedges (one respondent complained that "hedge cutting [every] 2/3 years doesn't do any good to very varied species rich hedgerows") and silted ditches, to feeding restrictions during bad weather. Several respondents reported difficulties relating to the timing of operations, with adverse effects on hay-making, annual rush cutting ("August - wettest month of year in Cumbria"), hedge cutting and ditch clearing. Another commented that "moving to a later cropping date [is] difficult when you have a small window of opportunity to get things done…".

Table 15. Difficulties experienced with the agreement.

Category	n (2005)	n (2011)	*'05 & '11 matches*
No difficulties	68	72	*59*
Other	10	6	*1*
Management restrictions/issues	5	6	*1*
Weed control/scrub growth	5	3	*1*
Problems with establishment of vegetation/buffer strips	2	2	*0*
Payment problems	1	2	*0*
total	**91**	**91**	***62***

In the 2005 survey a number of agreement holders (5.5% of those surveyed) reported difficulties with weed control and scrub growth, although fewer agreement holders (just over 3%) were concerned with this in 2011. One respondent, who reported this as a difficulty in both surveys, refers to "the impossible task of controlling ragwort, thistle and docks on permanent pasture". Other respondents also refer to the difficulties of controlling these pernicious weeds.

Difficulties captured by the category 'Other' include: an organic agreement holder not being able to source enough locally-produced organic cattle food (1 response); difficulties in sourcing quality breeding cattle (1); unwelcome "extra inspections" (1); onerous paperwork (2); livestock problems - sheep caught in hedges (2, reported by the same holding in both surveys). A couple of respondents (in 2005) were concerned about funding after the contract expires; the remaining answers seemed to refer to general problems not particularly related to the scheme (e.g. 'global warming') . One agreement holder responded that "There is not enough space here to answer this question…".

Of the discrete minor categories, two respondents stated they had general problems relating to getting paid, and another respondent stated "We were paid twice for several years and had to repay. Payment notices should be much clearer". Three respondent reported general problems with the establishment of vegetation and/or buffer strips, another considered that "It was a bit silly putting wild flower seed on to established grassland".

3.1.2.4 Conservation work.

Q: Did you carry out/have you carried out any conservation work on your farm:

Q12 (2005 only) prior to your current agreement?

Q12 (2005) & Q9 (2011) Do you carry out any conservation work, which is not covered by any existing agreements?

The 2005 survey asked agreement holders to state whether they had carried out any conservation work prior to their current agreement; in both the 2005 and 2001 surveys, agreement holders were asked if they had carried out any such work which was not covered by any of their existing agreements. Table 16 shows the categorised results of the two questions (note: the column ''05 & '11 matches' shows the number of holdings that gave the same answers to Q12 in 2005 and Q9 in 2011). It should be noted, however, that statistical testing indicates a significant difference (p = 0.03) between the categorised data from the 90 and 300 respondents for the surveys for Q12, 2005 ("Did you carry out/have you carried out any conservation work on your farm: prior to your current agreement?". The discrepancy mainly comes from three categories, 'Existing AES agreement' where there are fewer observations than expected for the 300 responders (97 out of a total of 408 responses), and both 'Tree planting/tree preservation/woodland management' and 'Pond/wetland creation/maintenance', where there are more observations (55 and 42 respectively, out of 408) than expected for the 300 responders.

Before entering (O)ELS 81% of survey respondents stated they had carried out some form of conservation work on their holding (see Table 16, column 'n (prior to 2005)'). Much of this work (46%) was carried out as part of existing AES agreements (category 12), and several respondents stated the improvements were undertaken as part of CSS and/or HLS, although very few intimated the type of work it consisted of (other than there is some mention of wall maintenance and hedge laying).

Table 16. Conservation work not covered by any existing Environmental Stewardship agreements, prior to 2005 and following enrolment in (O)ELS.

Category	n (prior to 2005)	n (2005)	n (2011)	*'05 & '11 matches*
Existing AES agreement	41	0	1	*0*
None/null	21	68	38	*32*
Hedgerow planting/management/restoration	20	6	16	*3*
Tree planting/tree preservation/woodland management	9	13	15	*2*
Stone wall and/or fence building/maintenance/restoration	7	2	9	*0*
Pond/wetland creation/maintenance	5	5	10	*2*
Buffer strips, beetle banks, field corner management	3	2	9	*0*
Organic requirements	2	0	1	*0*
Historic feature/building maintenance/restoration	1	2	2	*0*
Wildlife habitat provision and conservation planting	1	2	9	*1*
Other	0	2	6	*0*
Grassland management	0	1	3	*0*
Bird conservation	0	0	4	*0*
total	**110**	**103**	**123**	***39***

When agreement holders were asked whether, following (O)ELS participation, they had carried out any conservation work not covered by existing agreements, 34% of those questioned in 2005 stated that they did, and this increased to 59% in 2011 (in 2005 the majority of such work involved some form of arboriculture (category 2), such as tree planting or woodland management. Whilst this type of tree-related conservation activity was also prominent in the 2011 survey, the most widely practiced conservation work was reported to be hedgerow planting, restoration and management. Other prominent conservation-related activities in 2011 included pond and/or wetland creation and maintenance, the maintenance and the creation of buffer strips and beetle banks, and the management of field corners for the benefit of wildlife.

3.1.2.5 Impact of (O)ELS on the farm system.

Q43 (2005) (Q34 HLS) What has been/will be the impact on your faming in joining ELS?; Q16 (2011) What impact, if any, has joining the (OELS) had on your farm system?

In 2005 the majority of respondents (35%) considered that joining ELS had, or would have, only a small (or no) impact on their farm system, as shown in Table 17. In 2011, although a relatively high proportion (over 22%) of respondents similarly considered the impact of joining O(ELS) had been small, a greater proportion (almost 28%) reported environmental benefits (category 4) as the primary impact. This represents a 37% decrease in respondents reporting a minor impact, and almost a 200% increase in respondents reporting environmental benefits as the chief impact.

Null responses made up a high proportion of answers in both the 2005 and 2011 surveys, particularly so in the former case, although the reason for this remains unclear. It is possible that the high number of such answers in 2005 was due to the fact that many agreement holders had just joined the scheme and were waiting to find out what the impacts might be. Most null responses probably represent negligible impacts, but some such responses may indicate the difficulty experienced by agreement holders in answering the question.

Table 17. Impact on farm system of joining (O)ELS.

Category	n (2005)	n (2011)	*n ('05 & '11 matches)*
No/negligible/minor impact	37	25	*8*
Null	17	9	*1*
Major impact/change	13	1	*1*
Enhanced wildlife/environment/conservation	10	31	*4*
Other	9	11	*0*
Less intensive agriculture	7	14	*1*
Helps maintain what is already established	6	2	*0*
Financial incentive	5	10	*2*
Improved management	1	3	*0*
More difficult management/greater work commitment	0	5	*0*
total	**105**	**111**	***17***

For both the 2005 and the 2011 surveys a fairly high proportion of responses were entered into the category 'Other'. This represents views such as: "New ways of thinking" (1 response, in 2011); reduced soil erosion (3 responses, 2011); historical conservation (2, 2005; 1, 2011); and reduced income (1, 2005; 2, 2011), relating to e.g. reduced stocking rates. One of the respondents in the latter category stated that "Unless HLS is successful in some areas the ELS is our only option albeit it will mean a reduction in monetary terms compared with the ESA". Another respondent whose answer was classified under 'Other' noted the "Slow gradual reduction of pest[s] due to natural predators being encouraged to live on [the] farm". It should be noted that statistical testing indicates a slight statistical difference ($p = 0.07$) between the categorised responses of the 90 and 300 agreement holders for the surveys carried out in 2005. A large part of the discrepancy comes from the category 'Other', where there are fewer observations than expected for the 300 responders (only 10 out of a total of 338).

In 2005 over 12% of respondents considered that joining (O)ELS had, or would have, a major impact with only one of the initial 13 respondents maintaining this view in 2011. Unfortunately the respondents whose answers fall into this category did not provide any indication of what these major impacts may be, and for the 2005 survey this is perhaps indicative of new agreement holders believing that the agreement will result in big changes to their farm system, but being unsure as to how these changes will manifest themselves.

A number of agreement holders (5 in 2005 and 10 in 2011) considered the biggest impact on their farming systems to be in terms of the financial security that the agreement ensured. Two of the 2011 respondents in this category stated that the (O)ELS agreement had allowed them to remain in farming, implying that without such an agreement their farms would not have remained viable. Almost 7% of the responses in 2005, and nearly 13% of those in 2011, stated that the biggest impact was less intensive agriculture (category 6), including land being taken out of production, and the reduced use of fertilisers and/or pesticides. One respondent observed that their remaining livestock had higher health status due to the lower stocking rate. A number of agreement holders (1 in 2005 and 3 in 2011) stated the most significant impact of the scheme was improved management, mainly of walls and hedges, but also encompassing better land use planning (e.g. "More ordered approach to land use", 1 respondent, 2011).

In 2011 four and a half percent of responses were categorised as 'More difficult management/greater work commitment'. This is in contrast with zero responses falling into this category in 2005. Comments included "certain grazing restrictions which are not necessary", more weeds (and increased herbicide use to control them), problems with sheep caught up in hedges, and "Contractor complains about 2 year hedge growth".

3.1.2.6 Payment rates

Q44, 2005; Q35 (HLS), 2005: Do you think the cost of implementation of the scheme on your farm will be covered by the payment rate?;

Q17 (2011) Do you think the cost of implementing your original (O)ELS agreement on your farm was covered by the payment rates?

Just over 65% of respondents in 2005, and 73% of respondents in 2011, replied that the cost of implementing the scheme was adequately covered by the payment rate (Table 18). Reasons given were that the scheme did not require a change in farming practice, and it

paid for land not in production. Two respondents to the 2005 survey, and one to the 2011 survey, stated that financial re-evaluation was needed.

Conversely, 10 percent of 2005 respondents, and almost 18% of 2011 respondents, thought that the payment rate did not cover the costs. Reasons for this were variously given as the high cost of hedge, fence and wall maintenance and restoration, the fact that production margins were outstripping ELS rates, and that scheme implementation was proving too time-consuming. One respondent in 2005 and three respondents in 2011 commented that financial re-evaluation was needed.

The highest number of respondents falling into the 'Not known' category was 24% in 2005, which may reflect the fact that agreement holders had not had sufficient time to adequately form an opinion as to the balance between implementation costs and payment rates.

Table 18. Is the cost of implementation of the scheme covered by the payment rate?

Category	n (2005)	n (2011)	Reason(R)/comment (C)	n (2005)	n (2011)	*n ('05 & '11 matches)*
			R: no change in farming practice	1	1	*0*
			C: probably	7	0	*0*
			C: financial re-evaluation needed	2	1	*0*
Yes	59	66	C: just	5	2	*1*
			Null	42	62	*36*
			R: paid for what already done	1	0	*0*
			R: will pay for rent of land not in production	1	0	*0*
			C: financial re-evaluation needed	1	3	*1*
			C: probably not	1		
			R: high cost of hedge/fence/wall maintenance/restoration	0	5	*0*
			R: late payment	0	1	*0*
No	9	16	Null	6	0	*0*
			R: production margins outstrip ELS	0	2	*0*
			R: set up and renewal	0	1	*0*
			R: too time-consuming	1	1	*0*
			R: various reasons	0	2	*0*
			R: wetland fencing insufficient	0	1	*0*
			C: depends on premium price	2	0	*0*
Not known	22	8	C: financial re-evaluation needed	1	0	*0*
			R: high contractor costs	2	0	*0*
			Null	17	8	*0*
total	**90**	**90**	**total**	**90**	**90**	***38***

3.2 Interviews

Whereas the postal survey concentrated on agreements as a whole, interviews were concerned with management and effects of individual options. Only respondents that answered the questions in both 2005 and 2011, so allowing a direct comparison to be made, are included in the analysis. As for the postal questionnaire, the actual wording used in the two questionnaires is shown for each comparison made. Percentages have not been calculated due to the low number of responses for some of the options.

3.2.1 Option points allocations

QC1h (2005), and Q12 (2011) Do you think the points for this option were 'about right', 'too high/generous' or 'too low'?

For all option groups, the number of respondents stating that the number of points were about right increased in the 2011 interviews compared to those conducted in 2005 (Table 19). The greatest increase was reported for boundary options with 96% stating the points allocation was about right in 2011 compared to 81% in 2005. One farmer undertaking OB2 felt that the points were too high in 2011, though they felt they were about right in 2005. The number of farmers saying the points were too low also showed the greatest decrease for boundary features (a reduction of 8%).

Table 19. Views on points allocation for option groups.

Option group	*n*	2005			2011		
		Too low	About right	Too high	Too low	About right	Too high
Boundary features (E/OB1-13)	*96*	11	78	7	3	92	1
Trees & woodland (E/OC1-25)	*17*	3	14	0	0	17	0
Historic & landscape features (E/OD1-5)	*4*	1	2	1	0	4	0
Buffer strips (E/OE1-10)	*10*	2	6	2	1	9	0
Arable & rotational land (E/OF1-22)	*7*	2	4	1	1	6	0
Range of crop types (E/OG1-4)	*2*	0	0	2	0	2	0
Protect soil and water (E/OJ2-13)	*1*	1	0	0	0	1	0
Grassland outside SDAs & mixed stocking (E/OK1-5)	*25*	3	16	6	1	24	0
Grassland & moorland inside the SDAs (E/OL1-6)	*16*	2	13	1	3	13	0

In addition, in 2005 50 farmers said the points allocation was irrelevant: 20 for (O)EB options, 8 for (O)EC, 6 for (O)EK, 5 for (O)EE, 4 for (O)EL, 3 for (O)ED, 2 for (O)EF and 1 each for (O)EG and (O)EJ options. In the 2011 interview the majority of these now reported that the points allocation was about right, with only three respondents saying the points were too low (1 for OB11 and one respondent stating that both OB2 and 3 had points that were too low).

When responses of individuals in the two surveys were examined, the opinion of most respondents remained unchanged between the two sets of interviews, with no options showing large changes from too low to generous or too high (Table 20). The proportion of respondents making a more negative comment in 2011 (giving a score of -1) was slightly higher overall than those making a more positive comment (+1), but the difference was small (14% and 12% respectively).

Table 20. Changes in perception of points allocation for options.

Option group	*n*	-2	-1	0	+1	+2
Options for boundary features (E/OB1-13)	*96*	0	7	80	9	0
Options for trees and woodland (E/OC1-25)	*17*	0	0	14	3	0
Options for historic and landscape features (E/OD1-5)	*4*	0	1	2	1	0
Options for buffer strips (E/OE1-10)	*10*	0	3	5	2	0
Options for arable and rotational land (E/OF1-22)	*7*	0	1	5	1	0
Options to encourage a range of crop types (E/OG1-4)	*2*	0	2	0	0	0
Options to protect soil and water (E/OJ2-13)	*1*	0	0	0	1	0
Options for grassland outside the SDAs and options for mixed stocking on grassland (E/OK1-5)	*25*	0	7	15	3	0
Options for grassland and moorland inside the SDAs (E/OL1-6)	*16*	0	4	10	2	0

3.2.2 Impacts on farm business

C1e (2005) What effects do you think this option will have on your business?

Q6 (2011) What effects do you think this option had on you business (negative, positive, none)?

In 2011 respondents were encouraged to give a 'degree' of effect by being provided with the categories of 'negative', 'positive' and 'none' before being invited to provide further comments, whilst in 2005 they were only given a free text box to complete. Thus answers tended to consist of either 'none' or 'some'. In order to make a comparison between the two

years, those who had responded 'some' were categorised as either positive or negative based on their accompanying comment. In instances where no comment was given or it could not be determined whether the effect was positive or negative, these answers were not included in the analysis.

In both 2005 and 2011, the majority of respondents said that option in question would have no effect on their business, for all option groups (Table 21). The actual experience of undertaking option management appears to have led to more respondents reporting a positive effect than in 2005, before they had entered the scheme. In particular, farmers were more positive about boundary options (19% of respondents) and grassland and mixed stocking options (23%) in 2011 compared to 2005 (10% and 3% respectively). Numbers of farmers who perceived a negative effect were low in 2005 and reduced further for boundary features and tree and woodland options, with little change for other option groups.

Table 21. Effects of option on business.

Option group	n	2005			2011		
		Negative	None	Positive	Negative	None	Positive
Boundary features (E/OB1-13)	115	10	93	12	5	88	22
Trees & woodland (E/OC1-25)	22	2	19	1	1	20	1
Historic &landscape features (E/OD1-5)	7	4	3	0	0	6	1
Buffer strips (E/OE1-10)	15	2	12	1	3	9	3
Arable & rotational land (E/OF1-22)	10	1	8	1	1	7	2
Range of crop types (E/OG1-4)	2	0	2	0	0	1	1
Protect soil and water (E/OJ2-13)	0	0	0	0	0	0	0
Grassland outside SDAs & mixed stocking (E/OK1-5)	31	1	29	1	2	22	7
Grassland & moorland inside SDAs (E/OL1-6)	16	2	14	0	3	11	2

When responses of individual interviewees were considered, the views of most respondents were unchanged (score 0; Table 22). In general, a larger number of respondents became more positive in their views than negative, particularly for boundary features, and grassland options outside the SDAs and mixed stocking (22% of respondents for both option groups made a more positive comment (categories +1 and +2) in 2011 compared to 2005). Conversely, boundary feature options have also showed the greatest proportion of respondents taking a more negative view (-1 and -2).

Table 22. Degree of change in perceived effects of option on farm business.

Option group	*n*	-2	-1	0	+1	+2
Boundary features (E/OB1-13)	*115*	1	11	78	24	1
Trees & woodland (E/OC1-25)	*22*	0	2	17	3	0
Historic & landscape features (E/OD1-5)	*7*	0	0	5	2	0
Buffer strips (E/OE1-10)	*15*	0	2	10	3	0
Arable & rotational land (E/OF1-22)	*10*	0	2	6	1	1
Range of crop types (E/OG1-4)	*2*	0	0	1	1	0
Protect soil & water (E/OJ2-13)	*0*	0	0	0	0	0
Grassland outside SDAs & mixed stocking (E/OK1-5)	*31*	0	2	22	7	0
Grassland and moorland inside the SDAs (E/OL1-6)	*16*	0	2	11	3	0

Of the 218 who had answered this question in both years, 76 had completed the free text box in 2005 and 60 in 2011. Their comments were categorised into common answers (Table 23). In 2005, approximately 40% of respondents stated that there would be little or no effect on the business whilst a further 26% were more positive and predicted some benefit, either financially or terms of the management of the farm. After five years in the scheme, 42% reported positive financial and management effects, whereas the proportion mentioning additional costs, time and management to undertake their chosen options remained unchanged (approximately 16%). Three new comment categories became clear in 2011: an improvement in feature quality due to management (15%), environmental/wildlife benefits (13%) and a decline in feature quality and the environment (10%). Comments on improvements in feature quality were made particularly in relation to stone walls, sward composition and better grassland and rush pastures. A decline in feature quality was mentioned with regard to scruffier hedgerows (EB2), weed problems (EF11) and waterlogging of fields (OB9).

The 'Other' category, included 'already in place' (3 in 2005, 2 in 2011), which presumably referred to the management, 'ok so far' (3 in 2005), concern over weeds (1 in 2005) and need for cooperation from tenants and neighbours (1 in each year).

Table 23. Effect of option choice on perceived effects on farm business – free text answers.

Comment	2005 n = 76	2011 n = 60
None/negligible/will balance out/	29	2
Positive		
Financial/management benefits	20	25
Improvement in feature quality	0	9
Environmental/wildlife benefits	0	8
Negative		
Incur additional cost/time/management	12	9
Loss of production	6	5
Decline in feature quality/environment	0	6
Other	12	7

3.2.3 Additionality and continuity

QC1c (2005), Q2 (2011) If you had not chosen this option, would you still have carried out this management.

QC1i (2005) Would you continue with the management required under this option if you were to leave the scheme?

Two related but different questions are considered here, one of which was asked in both years, and one of which was only asked in 2005. Responses to the first question showed few large differences between the two interviews (Table 24). An increased number of respondents said they would carry out the stipulated management under options for trees and woodland, particularly E/OC1, 2 in 2011 compared to 2005, even if the feature was not included in their agreement. The greatest decreases in numbers of respondents who would carry out management even if not in the scheme were for grassland and mixed stocking options (E/OK1-5) and buffer strips (E/OE1-10). All respondents who would not continue with grassland management were undertaking OK1, 2, 3.

In 2005 only, respondents were asked whether they would continue with the prescribed management even if they left the scheme. Over three quarters of responses in 2005 indicated that management would continue if the farmer left the scheme, except for those options that led to taking land out of production, such as (O)EF1-22, and options involving management of trees and woodland ((O)EC1-25) (Table 24).

Table 24. Numbers of respondents who would continue with option management even if the option was not included in (O)ELS agreement.

Option group	*n*	Would have carried out management if option not chosen		Would continue with management if left scheme
		2005	2011	2005
Boundary features (E/OB1-13)	*116*	75	75	94
Trees & woodland (E/OC1-25)	*24*	13	18	15
Historic & landscape features (E/OD1-5)	*4*	3	3	3
Buffer strips (E/OE1-10)	*13*	11	6	11
Arable &rotational land (E/OF1-22)	*9*	4	4	4
Range of crop types (E/OG1-4)	*2*	1	1	2
Protect soil and water (E/OJ2-13)	*2*	1	1	2
Grassland outside SDAs & mixed stocking (E/OK1-5)	*31*	28	22	27
Grassland & moorland inside the SDAs (E/OL1-6)	*18*	12	11	15

3.2.4 Hedgerow management

QC2a (2005) How often do you cut your hedges (every year, every 2 years, other)?

Q1 (2011) How often did you cut your hedges (Every ?_ years)?

For options E/OB1, 2, 8, 9 the scheme prescription states that hedgerows should not be cut more than once every two years and for options E/OB3, 10 the cutting interval is increased to once every three years.

The majority of respondents indicated that their management of hedgerows had changed to meet the relevant option prescriptions (Table 25). However, two respondents were cutting their hedgerows every year, more frequently than prescribed. Almost a third of respondents undertaking standard hedgerow management now appeared to be cutting their hedgerows at the interval for enhanced management (every three years).

Other cutting frequencies reported included every 3-5 years, 1 in 5 years and 2-3 years.

Table 25. Frequency of hedge cutting.

Cutting frequency	EB1, 2, 8, 9 (n = 66)		EB3, 10 (n = 20)	
	2005	2011	2005	2011
Not done	6	3	5	4
Every year	23	2	5	0
Every 2 years	25	34	3	0
Every 3 years	4	19	4	13
Other frequency	8	8	3	3

QC2c (2005) Do you normally repair gaps or damage to hedges?

Q1f (2011) Did you normally replant gaps in your hedges?

For all hedgerow options, farmers reported in 2011 that gaps and damage were less likely to be repaired or replanted than had been stated in the 2005 interviews (Table 26). This decrease in numbers of farmers who would have repaired hedgerows could be because there is no specific requirement to do so within the option prescriptions.

Table 26. Number of respondents who would repair or replant gaps or damage to hedges.

Option	*n*	2005	2011
EB1, 2, 8, 9	*66*	46	28
EB3, 10	*17*	8	7

3.2.5 Ditch management

QC2e (2005) How often do you cut your ditch banks (every year, every 2 years, other)?

Q4a (2011) How often do you cut your ditch banks (every ?_ years or not done)?

For options E/OB6, 7, 8, 9, 10 the scheme prescription states that vegetation on ditch banks should not be cut more than once every two years. The majority of respondents indicated that their management of ditch banks had changed to meet the option prescriptions, with only one report in 2011 of ditch bank vegetation still being cut every year (Table 27).

Table 27. Frequency of ditch bank cutting.

Cutting frequency	EB6,7 (n = 16)		EB8,9,10 (n = 19)	
	2005	2011	2005	2011
Not done	9	8	8	7
Every year	3	0	5	1
Every 2-3 years	2	7	3	9
More than 3 years	2	1	3	2

QC2f (2005) At what time of year do you cut your ditch banks?

Q4b (2011) At what time of year did you cut your ditch banks? (early/late)

The scheme prescribes that ditch bank vegetation should be cut between 15 September and 28 February. In 2011 there were four farms (out of 19) where respondents reported cutting vegetation on some ditch banks outside this period, one in July/August, the others in early September, compared with just one in 2005 that was cutting August to early September.

QC2g (2005) How often do you cut the vegetation in the bottom of the ditch (every year, every 2 years, other)?

Q4c (2011) How often do you cut the vegetation in the bottom of the ditch (every ?_ years or N/A (always full) ?

QC2f (2005) At what time of year do you cut the vegetation in the bottom of the ditch?

Q4b (2011) At what time of year did you cut the vegetation in the bottom of the ditch? (early/late)

The scheme prescription states that up to 50 per cent of the vegetation in the bottom of the ditch may be cut every year between 15 September and 28 February. Two farmers reported cutting ditch bottoms every year in 2005, but none in 2011. All those who specified when they carried out this operation were doing so within the prescribed dates, in both 2005 and 2011.

Table 28. Frequency of ditch bottom cutting.

Cutting frequency	EB6,7 (n = 16)		EB8,9,10 (n = 19)	
	2005	2011	2005	2011
Not done	13	11	15	14
Every year	1	0	2	0
Every 2-3 years	0	2	0	3
More than 3 years	2	3	2	2

QC2i (2005) How often do you clean out your ditches (every year, every 2 years, other)?

Q4e (2011) How often do you clean out your ditches (every ?_ years or not done ?)

The scheme prescription states that ditches should not be cleaned out more than once during the 5 years of the agreement. In 2005 there were only three farms (out of 19) which reported clearing out ditches more frequently than this, and only one of these still reported doing so in 2011.

Table 29. Frequency of ditch cleaning.

Cutting frequency	EB6,7 (n = 16)		EB8,9,10 (n = 19)	
	2005	2011	2005	2011
Not done	1	6	1	6
Every year	0	0	0	0
Every 2-4 years	2	1	1	0
5 or more years	13	9	18	13

QC2k (2005) At what time of year do you clean out your ditches?

Q4f (2011) At what time of year did you clean out your ditches? (early/late)

Cleaning out of ditches should only take place during the period of 15th September to 31 January. In 2005, 3 farms reported undertaking this operation in the summer, and four more into February or March. In 2011 one farm was cleaning out ditches in July/August., and three in February.

3.2.6 Management of stone-faced hedge-banks and stone walls

QC2d (2005), Q2 (2011) Do/did you normally repair gaps or damage to your stone-faced hedge banks?

Only two respondents answered this question, one each of EB4 and EB5. In 2005, only one repaired gaps (EB4), but in 2011 both responded positively about repairing gaps or damage.

QC2l (2005), Q3 (2011) Do/did you normally repair gaps or damage to your stone walls?

Nine respondents answered this question. In 2005, seven said they undertook repairs but in 2011 all respondents stated that their stone walls were repaired.

3.2.7 Management of in-field trees

There was only one common question asked in both 2005/6 and 2011 interviews.

What was done with fallen wood beneath in-field trees?

In 2005, eight respondents with infield trees said that they removed fallen branches, only one said that it was left *in situ*. In 2011, only one of the nine farmers with trees in options EC1 or EC2 said that fallen wood was removed.

3.2.8 Grassland management

In this section, organic and non-organic options are reported separately, as the prescriptions differ with respect to the use of fertilisers and manures.

QC6d (2005) What rate of inorganic fertiliser do you currently apply per year? (Kg/N/Ha)?

Q25b (2011) What rate of nitrogen fertiliser did you apply per year (kg/ha of N)?

EK2/EL/OK2/OL2 Permanent grassland with low inputs

The prescription states that no more than 50 kg/ha nitrogen should be applied per year as inorganic fertiliser. Where fertiliser rates varied, interviewers asked farmers to specify minimum and maximum rates applied.

Table 30. Inorganic fertiliser applications on EK2/EL2 and OK2/OL2.

Application rates	EK2/EL2 (n = 11)				OK2/OL2 (n = 15)			
	2005		2011		2005		2011	
	Min	Max	Min	Max	Min	Max	Min	Max
None	5	3	9	9	15	15	15	15
1-50 kg/ha	5	5	2	2				
51-100 kg/ha	0	2						
>100 kg/ha	1	1						

Three farms reported applying fertiliser at rates above 50 kg/ha in 2005 on fields which were entered into the low input options. In 2011 most farms were not applying any inorganic fertiliser on fields in the low input option, and all were meeting the prescription. As expected, no organic grassland received inorganic fertiliser.

EK3/EL3/OK3/OL3 Permanent grassland with very low inputs

In these options, no nitrogen fertiliser should be applied.

Table 31. Inorganic fertiliser applications on EK3/EL3 and OK3/OL3.

Application rates	EK3/EL3 (n = 11)				OK3/OL3 (n = 7)			
	2005		2011		2005		2011	
	Min	Max	Min	Max	Min	Max	Min	Max
None	9	9	10	10	7	7	7	7
1-50 kg/ha	1	1	1	1				
51-100 kg/ha	1	1						
>100 kg/ha								

In 2005 most of the farms surveyed were not adding any inorganic fertiliser to their EK3/EL3 fields, although one farm reported applying 85 kg/ha. In 2011 only one farm was applying fertiliser, at "1 bag per acre", i.e. around 42 kg/ha of nitrogen. Inorganic fertiliser was not applied to any grassland under OK3 or OL3.

QC6f (2005) What rate of manure do you currently apply per year? (T/Ha)?

Q25c (2011) What rate of organic manure did you apply per year (t/ha of N)?

EK2/EL2 Permanent grassland with low inputs

For organic farms that had permanent grassland with low inputs, OK2/OL2, the prescription states that up to 12.5 tonnes/ha (5 tonnes/acre) of farmyard manure may be applied per year. For EK2/EL2 total nitrogen inputs from inorganic and organic manures should not exceed 100 kg/ha/year.

Table 32. Farm Yard Manure applications on EK2/EL2 and OK2/OL2.

Application rates	EK2/EL2 (n = 11)				OK2/OL2 (n = 15)			
	2005		2011		2005		2011	
	Min	Max	Min	Max	Min	Max	Min	Max
None	4	4	3	3	8	7	9	9
0-12.5 t/ha	3	5	7	7	5	6	6	6
>12.5 t/ha	4	2	1	1	2	2		

In 2005, several farms were applying FYM at above the prescribed rate. In 2011, all of the organic farms reported that they were within the prescribed levels of FYM usage. One non-organic farm (out of 11) was applying manure at above12.5 t/ha. Others were applying manure at lower rates, but could still have been exceeding the recommended nitrogen dosage.

EK3/EL3/OK3/OL3 Permanent grassland with very low inputs

For permanent grassland with very low inputs, options EK3/EL3/OK3/OL3, the prescription allows up to 12.5 tonnes/ha (5 tonnes/acre) of farm yard manure to be applied per year, but only where the grassland is regularly cut; no inorganic fertiliser should be applied.

Table 33. Farm Yard Manure applications on EK3/EL3 and OK3/OL3.

Application rates	EK3/EL3 (n = 11)				OK3/OL3 (n = 7)			
	2005		2011		2005		2011	
	Min	Max	Min	Max	Min	Max	Min	Max
None	6	5	5	5	4	4	4	4
0-12.5 t/ha	4	5	5	4	3	3	3	3
>12.5 t/ha	1	1	1	1				

One farm reported exceeding the 12.5 tonne/ha prescription on very low input fields in 2005, and a different farm did so in 2011.

QC6g (2005) Do you normally cut this field ? (Yes/No)

Q25f (2011) Did you cut this field for hay/silage ? (Y/N)

QC6i (2005) Is the field normally grazed ? (Yes/No)

Q25j (2011) Were the fields grazed? (Y/N)

Table 34. Cutting and grazing of low-input grasslands EK2/EL2 and OK2/OL2.

Cutting/Grazing	EK2/EL2 (n = 11)		OK2/OL2 (n = 16)	
	2005	2011	2005	2011
Cut for hay or silage	6	7	9	11
Grazed	11	11	11	16

Table 35. Cutting and grazing very low input grasslands EK3/EL3 and OK3/OL3.

Cutting/Grazing	EK3/EL3 (n = 11)		OK3/OL3 (n = 7)	
	2005	2011	2005	2011
Cut for hay or silage	3	5	2	5
Grazed	11	10	7	6

Most of the farms surveyed reported grazing the fields in the low and very low input grassland options; a smaller proportion were cut for hay or silage.

3.3 Field surveys

Field surveys were carried out on all resurveyed farms (where baseline assessments had been undertaken in 2005) that were interviewed in 2011/12. Monitoring of the condition of options assessed the environmental benefits provided by a sample of the first tranche of ES agreements. Analysis compared data from the beginning and end of agreement to establish the impact of ES management on feature condition. In addition, for a subsample of options, control features on the same farms but not in agreement were monitored to assess the likely impact of any changes in management under ES options.

Data analysed were combinations of ELS and OELS options. Except where stated otherwise, ELS and OELS options were analysed together. In the text below, EBx is used as an abbreviation to refer to combinations of the two types of options (EB/OBx) except where explicitly stated.

3.3.1 Hedgerows

Hedgerow options with similar prescriptions were grouped for the purposes of analysis. These groups consisted of EB 1, and 8 (Hedgerow management on both sides of the hedge and combined hedge and ditch management incorporating EB1 hedge management), EB 2 and 9 (Hedgerow management on one side of the hedge and combined hedge and ditch management incorporating EB2 hedge management), and EB 3 and 10 (Enhanced hedgerow management and combined hedge and ditch management incorporating EB3 hedge management).

3.3.1.1 Hedgerow height

Hedges in options EB1, 2, 8 and 9 should be maintained at minimum height of 1.5 m, and those in options EB3 and 10 should be maintained at a minimum height of 2.0 m, except when laid or coppiced as part of a regular management cycle.

Comparison between 2005/6 and 2011

In 2005/6, hedgerow height was recorded in the following categories: <1m, 1-1.4m, 1.5-1.9m, 2.0-2.9m, 3.0-3.9m, 4.0-4.9m and 5+m.. In 2011, exact heights were recorded (to the nearest 0.1m), but in order to allow comparison with the baseline data, these were converted to the categories used in the earlier assessment. There were very few hedges in the lowest category, so the first two categories were combined for analysis to form a category <1.4.

Because heights were recorded in categories of different size, the response variable used in the statistical analysis was the frequency of observations of increase, decrease or no change in height category between 2005/6 and 2011. These data were subjected to a chi-squared test for association between height difference and option group. The difference between option groups was not statistically significant (P=0.058). Most hedgerows had increased in size (Figure 1).

Although there was no significant difference in the degree of change in individual hedges between option groups, the distributions of the height categories and patterns of overall change in height categories were different for the option groups (Figure 2). The largest decrease for EB1 + EB8 was in the 1.5-1.9 category, and the biggest increases occurred in the 2.0-2.9 and the 3.0-3.9 categories. Conversely, for EB2 and EB9, the frequency of

hedges in the 2.0-2.9 and the 3.0-3.9 categories decreased slightly and there was a corresponding increase in the 4.0-4.9 category. For this group there was a large peak in both years in the 5.0+ category; this probably indicates hedges next to woodlands (or possibly buildings) where only trimming of one side is possible. For EB3 + EB10, there were decreases in all categories up to and including 2.0-2.9, and increases in the 3.0-3.9 and 5+ categories (Figure 2).

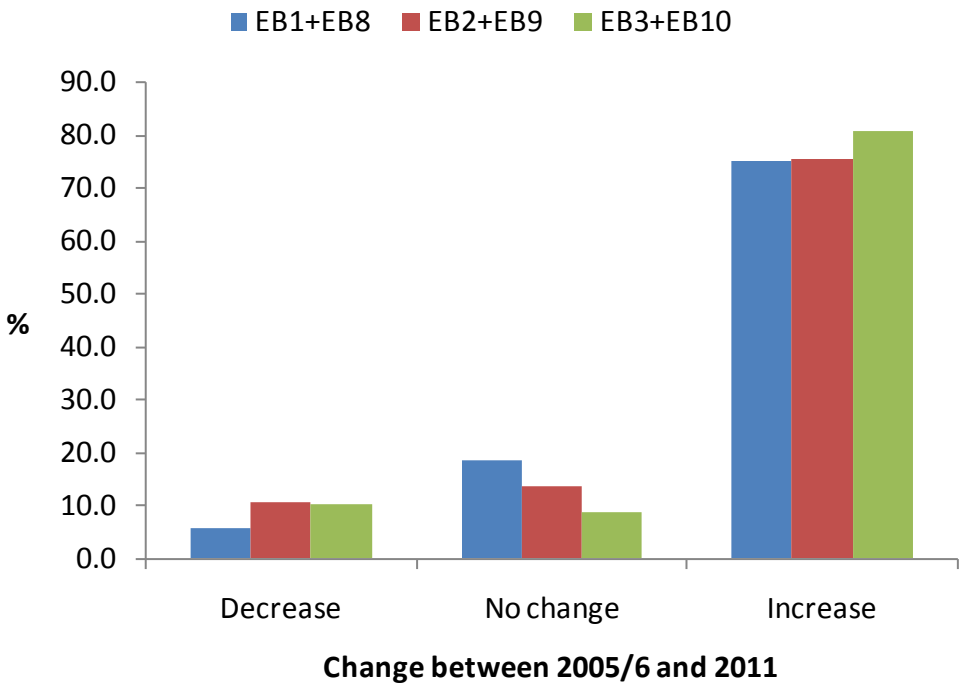


Figure 1. Changes in height category between 2005/6 and 2011 as a percentage of the total hedgerows in each option pair.

Despite the observed increases, there were still some hedges that were below the prescribed height for the options concerned. In 2011, 4.2% of hedges monitored in options EB1 and EB8, and 4.4% of hedges in options EB2 and EB9 were below 1.5 m (4.9% and 2.9% respectively in 2005/6), while 11.2% of hedges in EB3 were below 2.0 m in height, down from 18.0% in 2005/6. It is probable that some at least of these hedges that were below the prescribed height had been laid or coppiced within the agreement and were still regrowing.

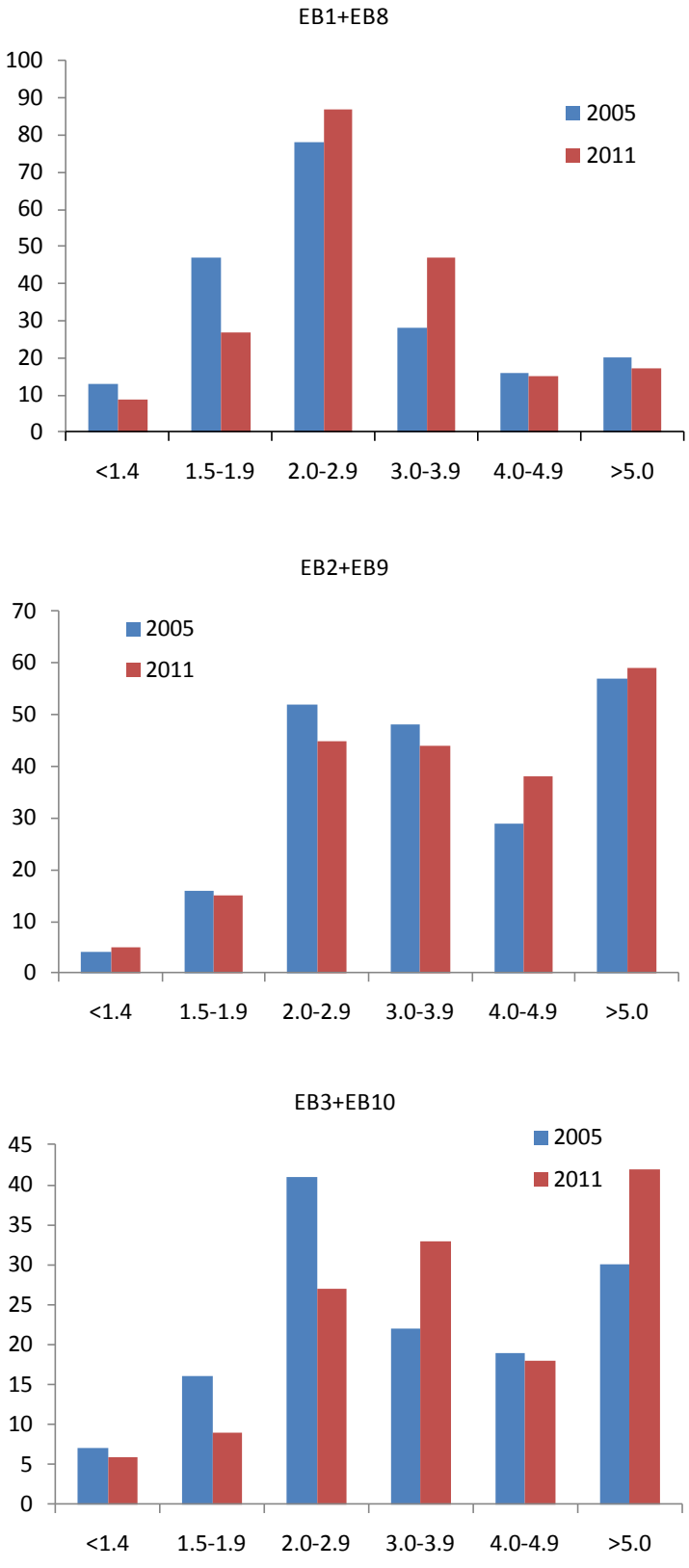


Figure 2. Frequency distribution of hedgerow height categories for the three option pairs.

Comparison between features in options and control features (not in ELS)

Hedgerows in options were compared with those not in options (control hedges) by REML variance components analysis of log(x+0.1) transformed data, with farm as a random variable. There was a significant difference between control and option hedges (P=0.003; Figure 3), with control hedges being on average taller than hedges in ELS options (arithmetic means were 3.35m and 2.46m for control and option hedges respectively. There was also a significant difference between farms at P<0.001.

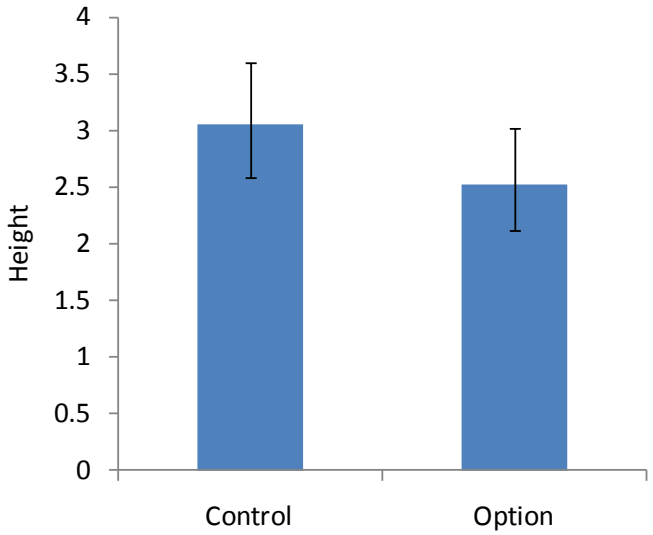


Figure 3. Predicted geometric mean heights of hedgerows in ELS options compared to control hedges (back transformed data) with 95% confidence intervals.

3.3.1.2 Lines of trees

Comparison between 2005/6 and 2011

Hedgerows were classified as lines of trees if the majority of canopy was associated with trees, single-tree width, at least 20 m long, and where the bottom 2 m of the feature was no longer a continuous shrubby feature of 20 m or more in length, i.e. shrubs could be absent or present only as some scattered bushes. The association between changes and option groups was analysed using a chi-square test. Some hedgerows not classified as such in 2005/6 had become lines of trees by 2011, with significant differences between the option groups (P=0.008). Although the analysis was carried out on frequencies, for ease of comparison, data have been converted to percentages in Figure 4. The proportion of changes was highest for EB2+EB9: 8.8% of these had become lines of trees and 4.6% were previously classified as lines of trees but were not so classified in 2011. These may have been laid or coppiced. For EB1+8, 8.7% of hedges were reclassified as lines of trees in 2011, whilst EB3+10 showed the least change, with only 2.9% being reclassified as lines of trees and 0.7% no longer classified as lines of trees. None of the boundaries in EB1+8 that had previously been classed as lines of trees had changed their classification (Figure 4).

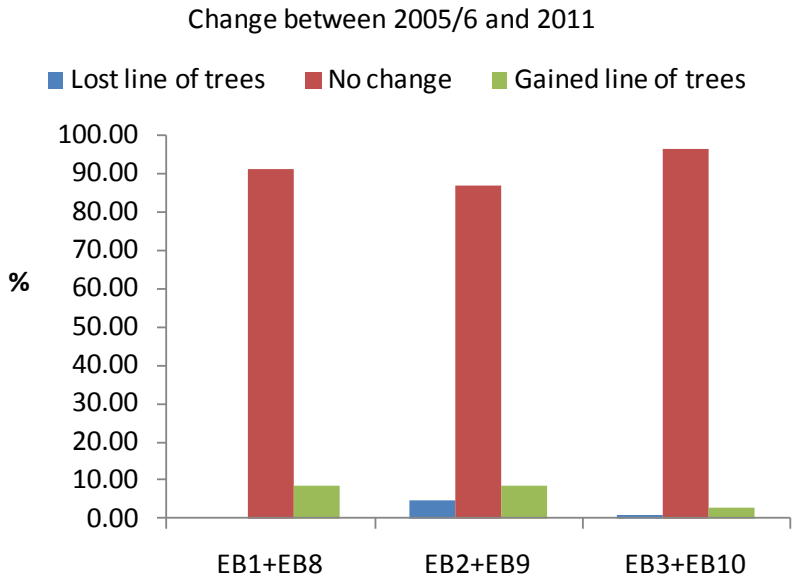


Figure 4. Changes in classification as a line of trees between 2005/6 and 2011 as a percentage of the total hedgerows in each option pair.

The larger increase in options EB2 and EB9 reclassified as lines of trees may result from the fact that only one side is managed by the agreement holder. The other side could be adjacent to a wood, or under the control of a neighbouring farm that did not trim the hedge.

Despite the differences in degrees of change, the actual percentages of hedgerows classed as lines of trees were very similar for EB1+8 and EB2+9. However, the percentages for EB3+10 were lower (2.2 and 4.4% in 2005/6 and 2011 respectively, cf. 3.5-5.5% in 2005/6 and 9.7-12.2% in 2011 for the other options; Figure 5).

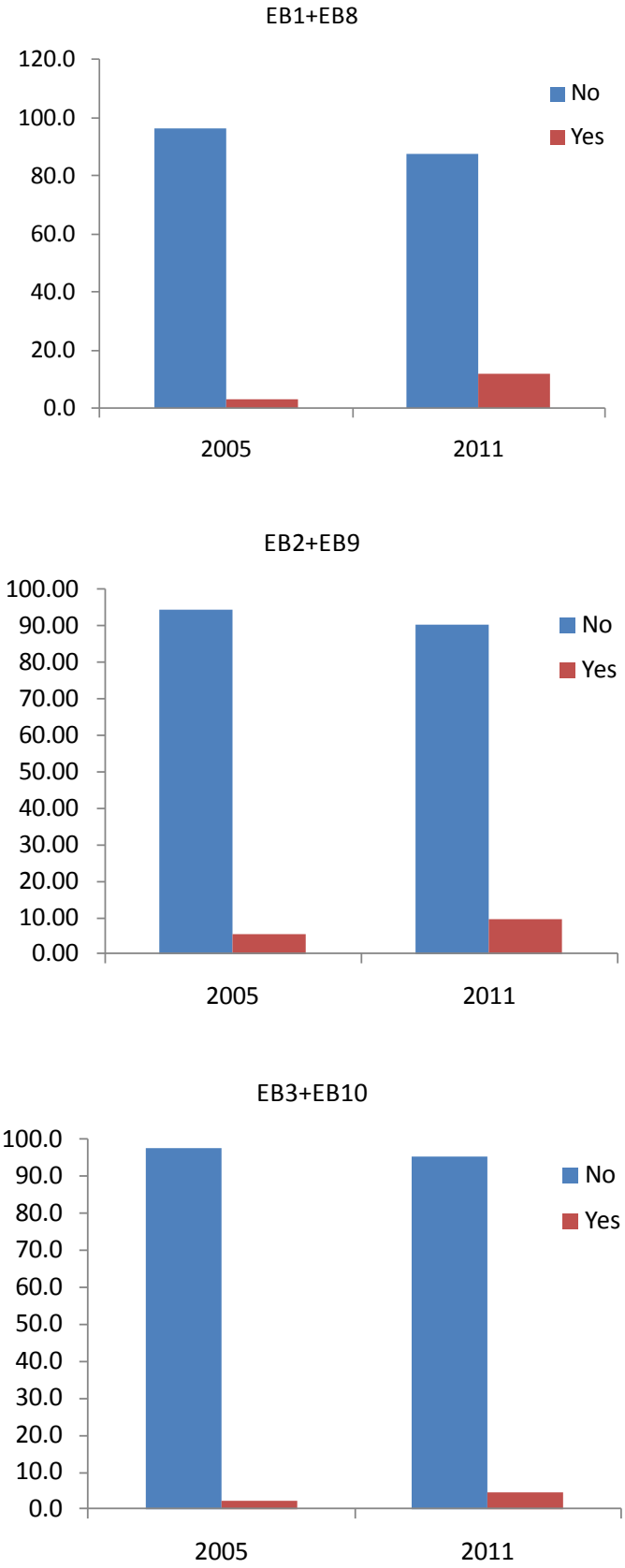


Figure 5. Percentage frequencies of lines of trees in 2005/6 and 2011 for the three option pairs.

3.3.1.3 Hedgerow width

Comparison between 2005/6 and 2011

Hedgerow width was recorded as a continuous variable in both the baseline assessment and the re-assessment in 2011. The difference between option groups for change in width between 2005/6 and 2011 was analysed using a REML[6] approach, with farm as a random variable. There was no significant difference between the option groups, but there was a significant difference between farms (P<0.001).

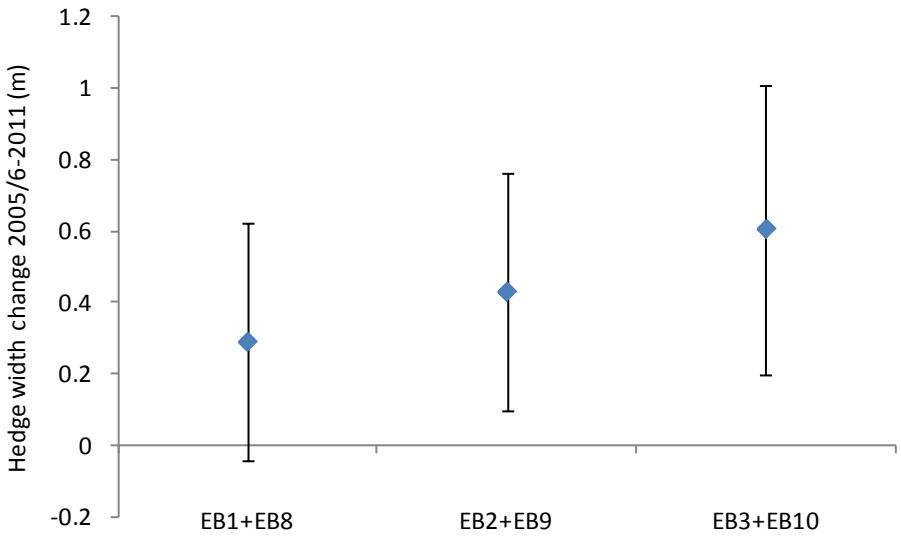


Figure 6. Change in mean hedge width between 2005/6 and 2011 for three option pairs, with 95% confidence intervals.

Hedge width increased on average by 0.29-0.613 m between 2005/6 and 2011; increases were statistically significant for EB2+9 and EB3+10 (both confidence limits above zero, see Figure 6).

Comparison between features in options and control features (not in ELS)

As for hedgerow height, hedges in options were compared with control hedges by REML variance components analysis of log(x+0.1) transformed data, with farm as a random variable. There was a significant difference in width between option and control hedges (P<0.001). Control hedges were wider on average than hedges in options (arithmetic means were 2.80 and 2012 for control and option hedges respectively). There was a significant difference between farms (P<0.001).

[6] Restricted Maximum Likelihood.

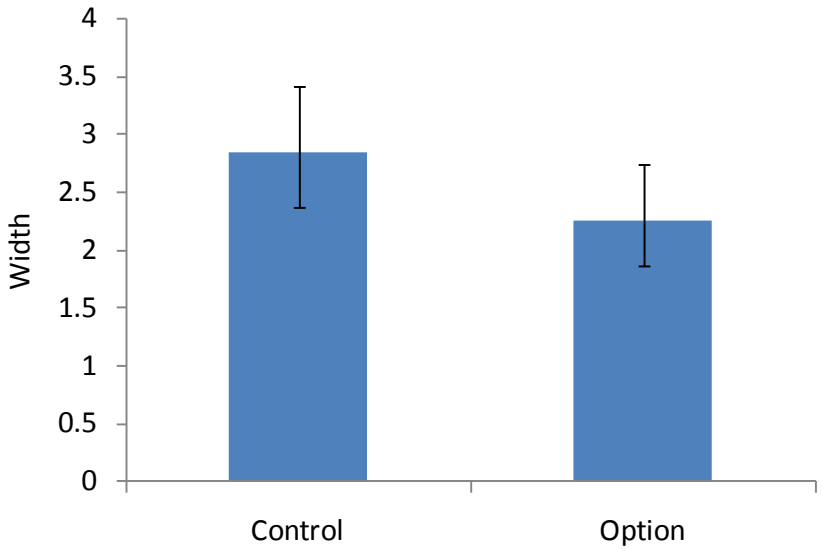


Figure 7. Predicted geometric mean width of hedgerows in ELS options compared to control hedges (back transformed data) with 95% confidence intervals.

3.3.1.4 Gaps in hedgerows

Comparison between 2005/6 and 2011

The percentage of each hedge composed of gaps was estimated for each hedge surveyed. As the data were not continuous (estimates were made in categories), the association between changes and option groups was analysed using a chi-squared test on the frequency of observations with no change, decrease or increase in percentage gaps between 2005/6 and 2011.

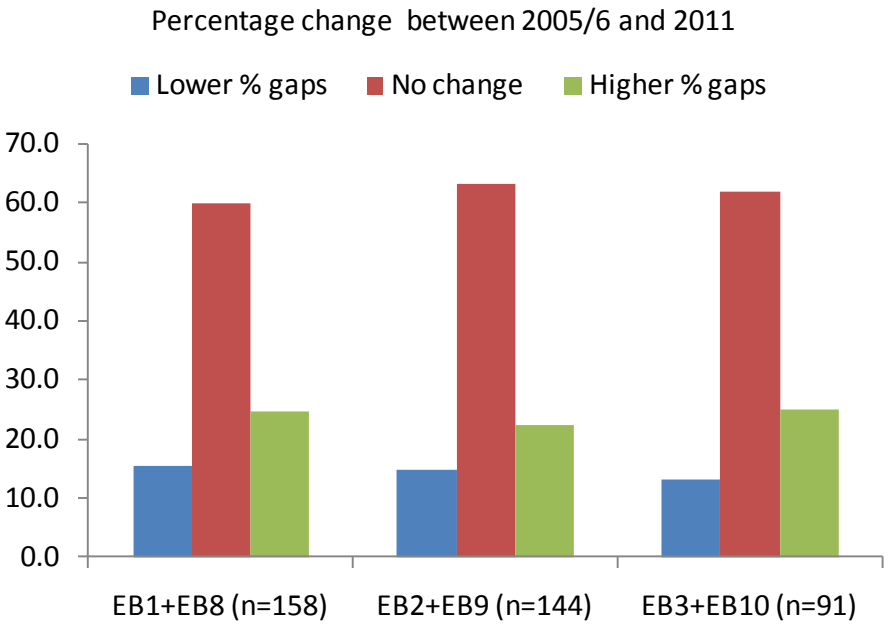


Figure 8. Changes in percentage of hedgerow composed of gaps between 2005/6 and 2011, as a percentage of the total hedgerows in each option pair.

Although the analysis was carried out on frequencies, for ease of comparison, data have been converted to percentages of the total number of hedges surveyed in Figure 8. The majority of hedges surveyed showed no change in the percentage of the hedge length composed of gaps, but of those where changes were noted, more showed an increase in percentage gaps than a reduction (Figure 8). There was no significant difference between option groups.

On average, the percentage of gaps recorded in 2011 was higher than in 2005/6; this was especially noticeable for EB3+10, though in all cases the percentages were small (Figure 9).

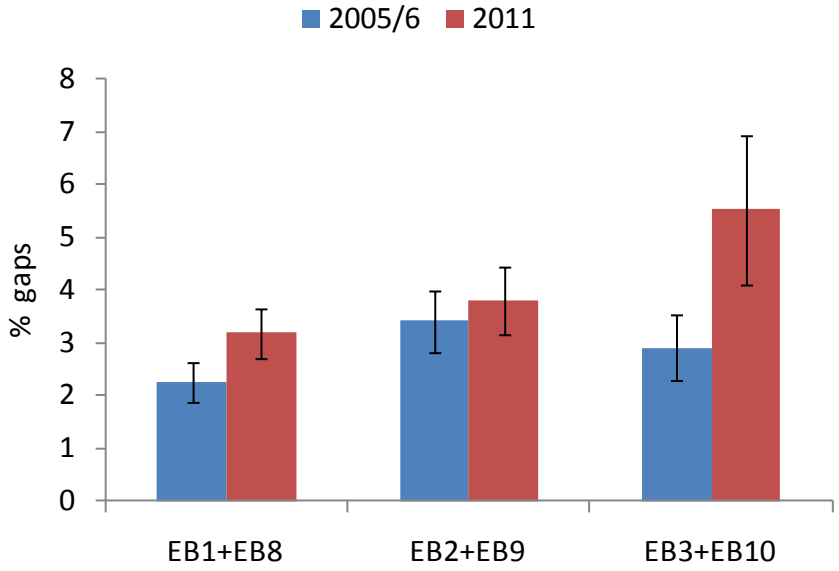


Figure 9. Mean percentage gaps in hedgerows recorded in 2005/6 and 2011, in the three option groups, ± standard error.

The presence of gaps wider than 5 metres was also recorded, and the frequency of observations with no change, loss or gain in wide gaps was analysed using a chi-squared test. As before, the data have been converted to percentages of the numbers of hedges observed in Figure 10, for ease of comparison. There was no significant difference between option groups. In each case, 80% or more of hedges surveyed showed no change in the presence of gaps greater than 5m, and a similar percentage had gained wide gaps (8-10%) as had lost them (6-10%).

On average, there was little change in the percentage of hedgerows with gaps greater than 5 metres increased from between 2005/6 and 2011 (from 14.1 to 15.6%).

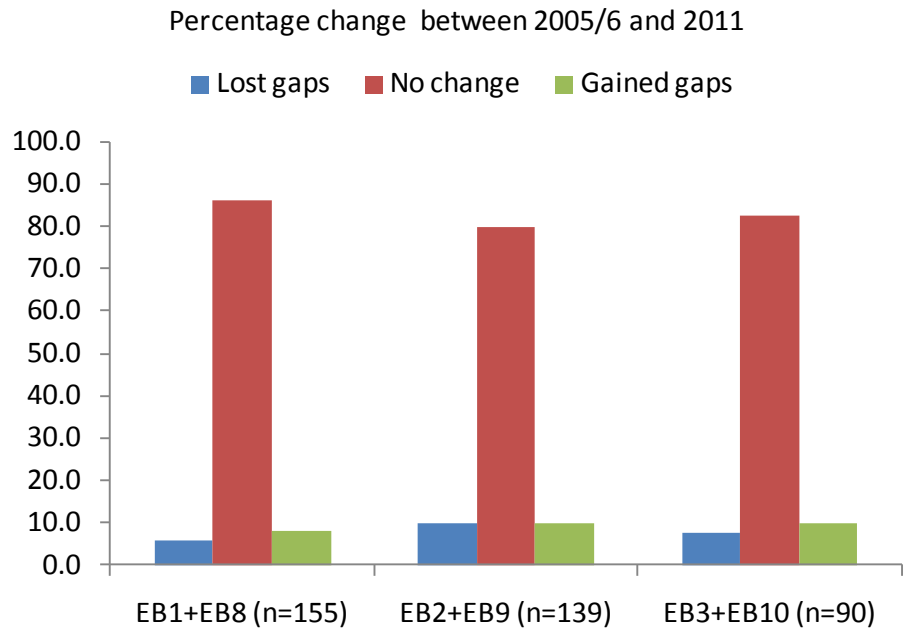


Figure 10. Changes in percentage of hedgerow with gaps > 5m present between 2005/6 and 2011, as a percentage of the total hedgerows in each option pair.

Comparison between features in options and control features (not in ELS)

For the purposes of analysis, percentage gap data were converted to a categorical variable, comprising numbers of hedgerows with gaps as a percentage of total length in the following categories: 0, 1-2, 3-9, 10-19 and 20+. A chi-square test was performed on the resulting dataset. There was no significant difference overall between control and option hedges in the frequency of occurrence in these categories, though there were more control hedges with more than 20% of the length composed of gaps (Figure 11).

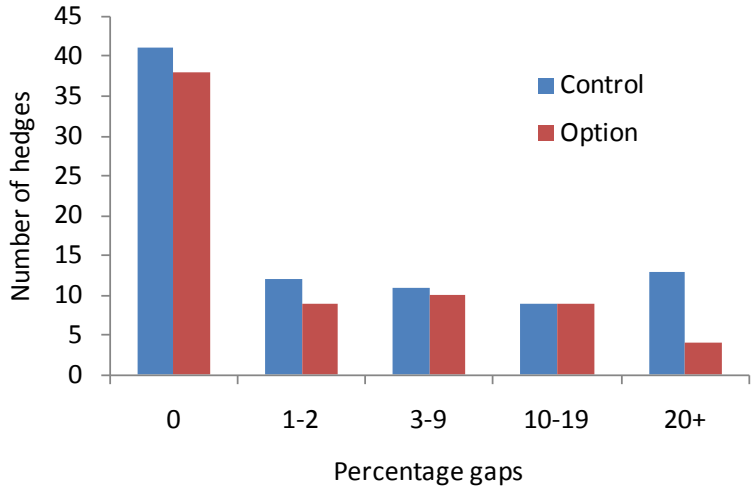


Figure 11. Percentage hedgerow length composed of gaps for hedgerows in options compared to control hedges.

The presence or absence of gaps wider than 5m was also compared between control and option hedges using a chi-square test. There was no significant difference between control and option hedges. On average, 25% of control hedges and 19% of hedges in options contained gaps greater than 5m wide.

3.3.2 Ditches

As for hedges, ditch options with similar prescriptions were grouped for the purposes of analysis. These groups consisted of EB6 (ditch management), EB7 (half ditch management) and EB8, 9 and 10 (Combined hedge and ditch management incorporating EB1, 2 and 3 hedgerow management respectively).

3.3.2.1 Number of plant species

Comparison between 2005/6 and 2011

The number of plant species growing on ditch banks was recorded in five 1 m^2 quadrats. The difference between option groups for change in width between 2005/6 and 2011 was analysed using a REML[7] approach, with farm as a random variable. There was no significant difference between the option groups, but there was a significant difference between farms (P<0.001). Mean species number decreased between 2005/6 and 2011 for all three option groups, though the decrease was only significantly different from zero at P<0.05 for EB8/9/10 (Figure 12).

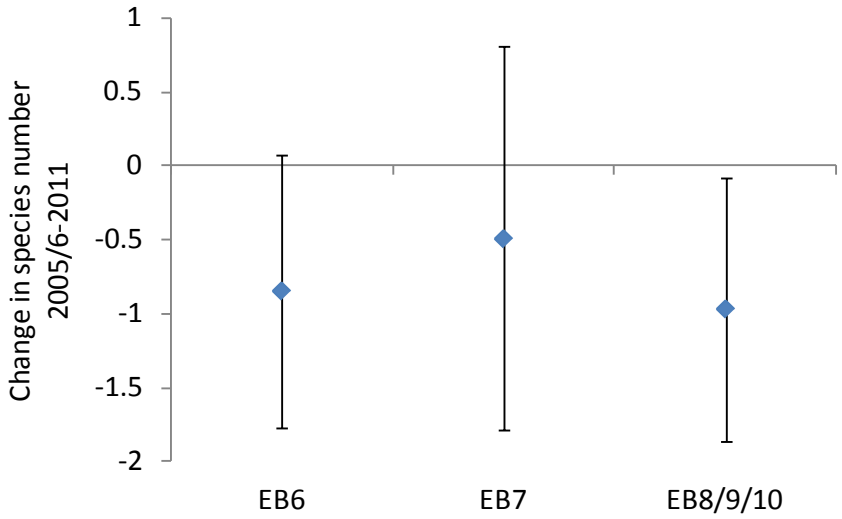


Figure 12. Change in mean number of plant species on ditch banks between 2005/6 and 2011 for three option pairs, with 95% confidence intervals.

[7] Restricted Maximum Likelihood.

3.3.2.2 Presence of aquatic vegetation

Comparison between 2005/6 and 2011

Presence or absence of submerged, floating or emergent aquatic vegetation was recorded in each ditch surveyed. A chi-square test was used to test for association between change 2005/6 - 2011 and option group. No significant differences were detected between option groups for any of the three variables.

Submerged vegetation

In most cases (79%, 87% and 90% for EB6, 7 and 8/9/10 respectively) there was no change in the status of the submerged vegetation. There was also little difference in numbers of losses and gains (Figure 13).

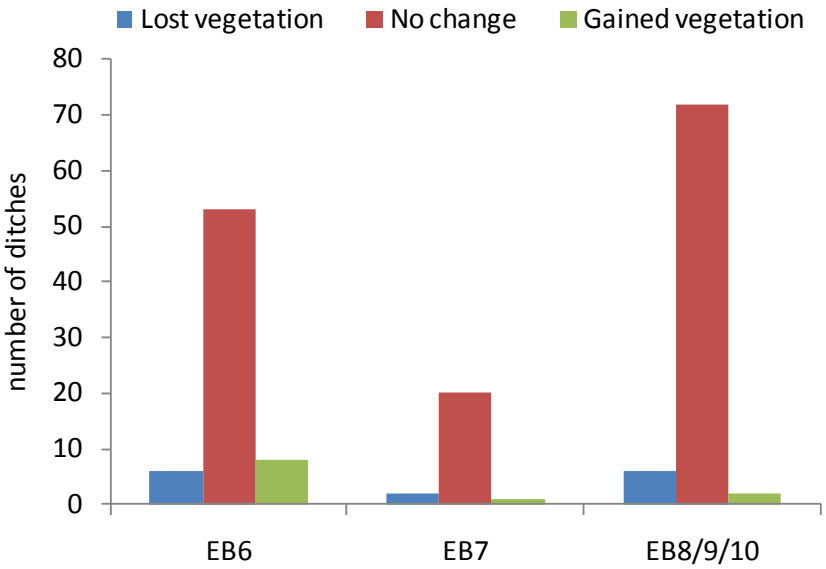


Figure 13. Change in presence of submerged vegetation in ditches between 2005/6 and 2011.

Net numbers of ditches with and without submerged vegetation were very similar for each option group between 2005/6 and 2011 (Table 36). EB6 and EB7 were more likely to have submerged vegetation present (25 and 11% of ditches respectively) than EB8/9/10 (5%).

Table 36. Numbers of ditches with submerged vegetation recorded in 2005/6 and 2011.

Presence of submerged vegetation	EB6		EB7		EB8/9/10	
	2005/6	2011	2005/6	2011	2005/6	2011
No	51	49	20	21	74	78
Yes	16	18	3	2	6	2

Floating vegetation

Results were similar to those for submerged vegetation (Figure 14). For the three options/ option groups EB6, EB7 and EB8/9/10, 81, 91 and 94% respectively showed no change.

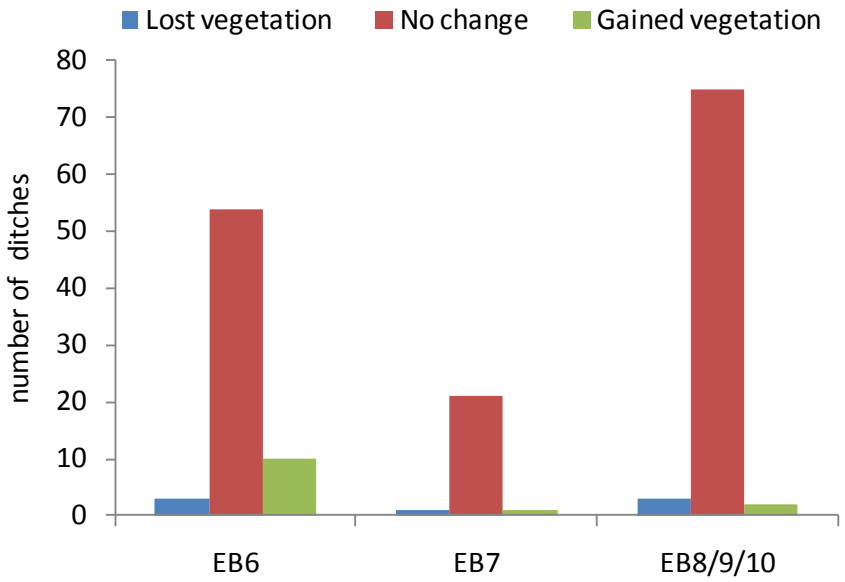


Figure 14. Change in presence of floating vegetation in ditches between 2005/6 and 2011.

As for submerged vegetation, most ditches did not have floating vegetation present in either year (Table 37). On average, 23, 13 and 7% of ditches in options EB6, 7 and 8/9/10 respectively had floating vegetation recorded.

Table 37. Numbers of ditches with floating vegetation recorded in 2005/6 and 2011.

Presence of floating vegetation	EB6		EB7		EB8/9/10	
	2005/6	2011	2005/6	2011	2005/6	2011
No	55	48	20	20	74	75
Yes	12	19	3	3	6	5

Emergent vegetation

Levels of change were greater for emergent vegetation than for submerged or floating vegetation (Figure 15). On average, 23% of ditches re-surveyed had lost, and 10% had gained emergent vegetation.

A higher proportion of ditches surveyed has emergent vegetation present than submerged or floating vegetation (53, 48 and 19% respectively for EB6, 7 and 8/9/10). As for submerged or floating vegetation, presence of emergent vegetation was more likely to be recorded in EB6 and EB7 ditches than those next to hedges (EB8/9/10). Despite the levels of change

recorded for individual ditches (Figure 15), there was very little net change in numbers of ditches with emergent vegetation present between 2005/6 and 2011 (Table 38).

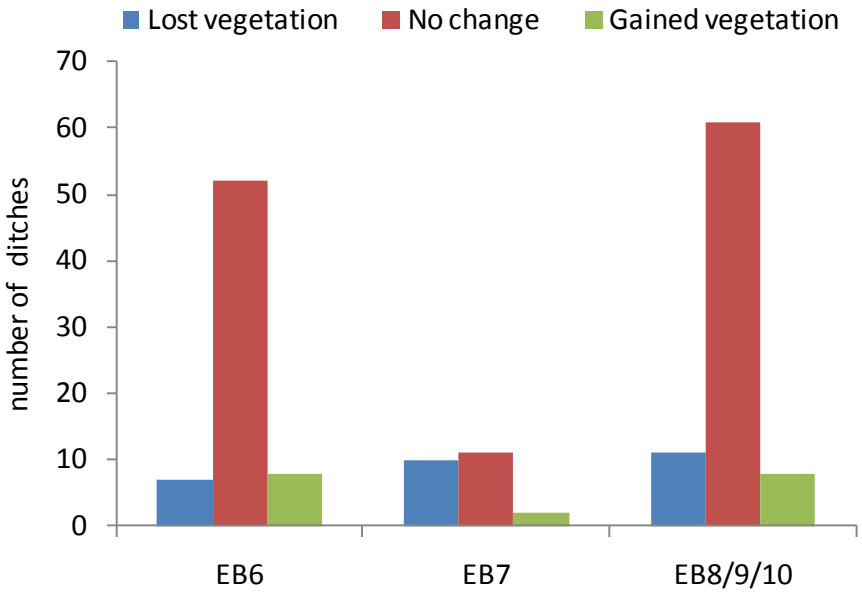


Figure 15. Change in presence of emergent vegetation in ditches between 2005/6 and 2011.

Table 38. Numbers of ditches with emergent vegetation recorded in 2005/6 and 2011.

Presence of emergent vegetation	EB6		EB7		EB8/9/10	
	2005/6	2011	2005/6	2011	2005/6	2011
No	32	31	8	16	63	66
Yes	35	36	15	7	17	14

3.3.3 Stone walls

Under option EB11 (stone wall protection and maintenance), agreement holders are obliged to protect walls entered into the scheme from deterioration, and repair gaps where these occur during the course of the agreement

Comparison between 2005/6 and 2011

Data were collected for percentage of wall length consisting of gaps, with top stones missing, or showing signs of bulging, bellying or slumping. Because it was difficult to estimate percentages precisely in the time available, estimates were recorded in categories. The resulting data were not suitable for statistical analysis of change using commonly used methods, due to the distributions of the data and large numbers of zeros in most categories. Baseline data and 2011 data are presented below.

Very few walls had significant percentages of their length composed of gaps. There was some evidence of an increase in numbers of walls with small gaps (1-5% of the wall length) between 2005/6 and 2011 (Figure 16).

Some walls had top stones missing, but in most cases this was only observed over 1-5% of the wall length, though a few walls were missing top stones over substantial lengths (Figure 17). Although there was some indication of a slight increase in the extent of walls with a short length that was missing top stones, there were fewer walls missing top stones over longer percentages of the wall length in 2011 Figure 17.

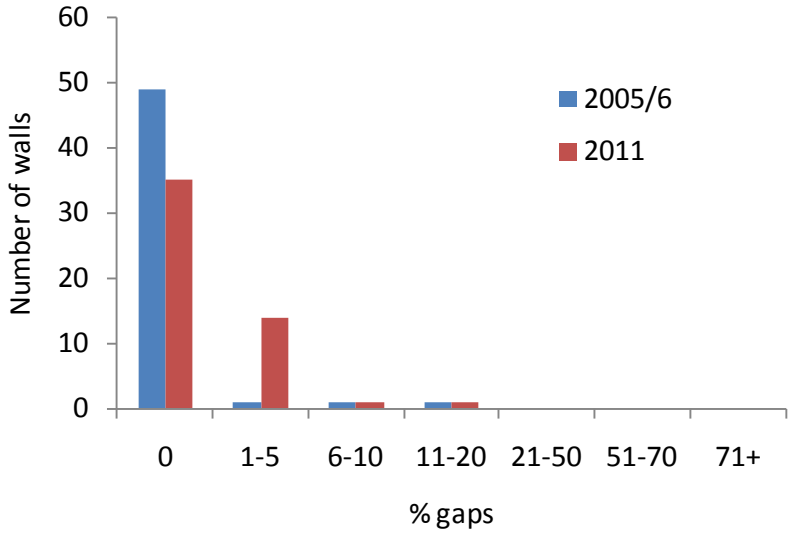


Figure 16. Numbers of walls with different categories of gaps as percentage of wall length.

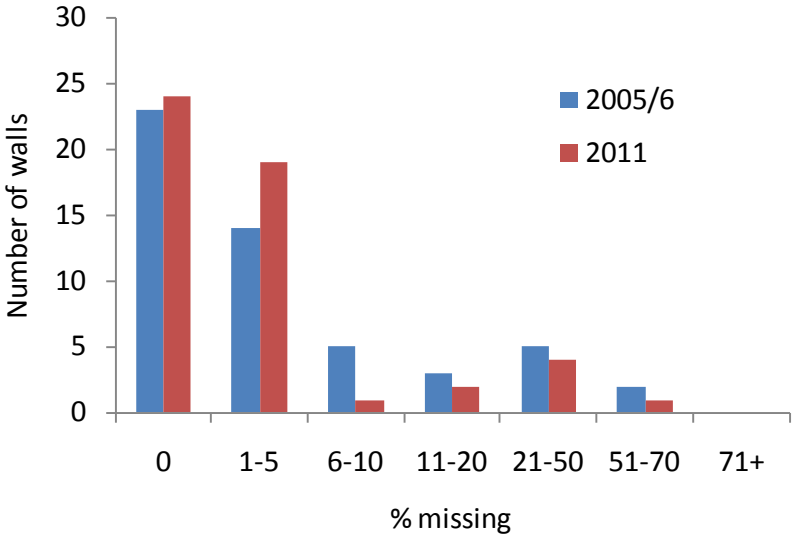


Figure 17. Numbers of walls in different categories of percentage of wall length with top stones missing.

Results for percentages of wall length affected by bulging, bellying or slumping were similar to those for missing topstones. There was some indication of a small increase in deterioration affecting small lengths of wall, and a few walls with significant proportions affected (Figure 18).

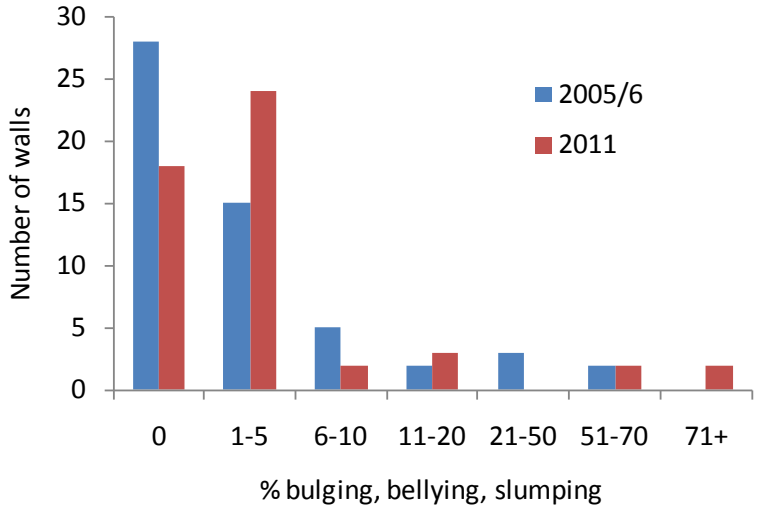


Figure 18. Numbers of walls in different categories of percentage of wall length showing bulging, bellying or slumping.

3.3.4 In-field trees

Evidence of various activities or features below the tree canopy was collected, to investigate whether their occurrence had changed during the life of the agreement. These were: cultivation, presence of fallen timber at least 20 cm in diameter, livestock damage, storage of material or machinery, supplementary feeding (grassland) and weed control. Where the data were amenable, chi-square tests were carried out to investigate whether there was a significant change between 2005/6 and 2011 in the frequency of presence/absence of the activities. No significant differences between the years were found for any of the variables tested.

There were no instances of supplementary feeding in either the baseline or 2011 datasets. Storage of materials or machinery was only recorded on one site in 2005/6, and on none in 2011. Other data are summarised in Table 39

The option prescription for EC1 (Protection of in-field trees on arable land) prohibits cultivation within an area extending 2 m beyond the edge of the canopy. However, cultivation was recorded beneath the canopy on several sites, including some in 2011 where it was not recorded in the baseline assessment (Table 39). Cultivation was recorded beneath 7 out of 16 trees in option EC1 in 2005/6, and 3 out of 38 trees in option EC2 (Protection of in-field trees on grassland). Worryingly, cultivation was also recorded in 13 out of the 16 trees in EC1 in 2011. No instances of cultivation beneath trees in EC2 were recorded in 2011.

Fallen timber was recorded beneath eleven trees in 2005/6, all in EC2. In 2011, none of these had fallen timber beneath them, but seven trees were recorded with fallen timber, none of which had a record for this in the baseline year. Five of these were in EC1.

Livestock damage to trees was recorded in 8 instances in both the baseline year and 2011, but only two of these were the same trees (Table 39). Evidence of weed control beneath trees was recorded in three instances in 2005/6 and in seven instances in 2011, two of which were the same trees (Table 39).

Table 39. Occurrence of cultivation, presence of fallen timber, livestock damage, and evidence of weed control beneath the canopy of in-field trees in options EC1 and EC2.

Attribute	2005/6 No 2011 No	2005/6 Yes 2011 No	2005/6 No 2011 Yes	2005/6 Yes 2011 Yes
Cultivation	38	3	6	7
Presence of fallen timber	36	11	7	0
Livestock damage	40	6	6	2
Weed control	46	1	5	2

3.3.5 Woodland fences and edges

Option EC3 supports the maintenance of woodland fences, while option EC4 covers the management of woodland edges.

Option EC3 prescribes the maintenance of a stockproof fence around woodland, and the exclusion of livestock. Of 51 woodlands in option EC3, 45 were surrounded by stockproof fences in 2011, of which seven had not been stockproof in 2005/6. However, five woodland fences that had been recorded as stockproof in 2005/6 were no longer considered to be so in 2011, and one was not considered to be stockproof in either year (Table 40). One woodland was recorded as showing evidence of grazing in the baseline year, but this had increased to four in 2011 (Table 40).

Table 40. Quality of fences and evidence of grazing in woodlands under option EC3.

Attribute	2005/6 No 2011 No	2005/6 Yes 2011 No	2005/6 No 2011 Yes	2005/6 Yes 2011 Yes
Stockproof fence	1	5	7	38
Evidence of grazing	46	1	4	0

As there were only three records for EC4, these results are not reported here.

Data on the condition of the woodlands will be reported later.

3.3.6 Archaeological features on grassland

Option ED5 provides for the maintenance of permanent grassland over archaeological sites and maintenance of ridge-and-furrow grassland. Swards in this option were assessed for a range of 'detrimental indicators', in terms of the percentage of the area affected (where present). These indicators were: burrows, bare ground, trees, scrub, bracken, reeds, paths, vehicle tracks, poaching, fires, new drainage, non-archaeological excavation and erosion. As the percentage area affected by individual indicators was in most cases low or zero, the percentages were summed for the purposes of analysis.

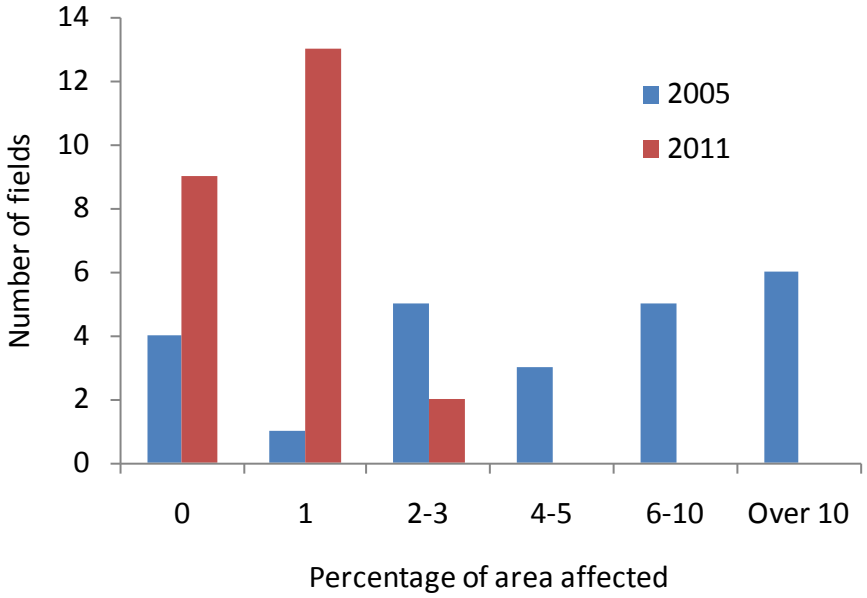


Figure 19. Percentage area affected by detrimental indicators in swards under option ED5 (archaeological features on grassland), in 2005/6 and 2011.

An improvement in condition was seen between the baseline year and 2011. There were more swards with no detrimental indicators or very low areas affected in 2011 than in 2005/6. No fields had more than 3% of the area affected in 2011. In contrast, a number of fields had detrimental indicators affecting higher areas in 2005/6 (Figure 19).

No evidence of supplementary feeding was noted on any of the 24 fields assessed. Tipping or dumping of material was noted on one site in the baseline year, but not on any sites in 2011.

3.3.7 Grassland with low or very low inputs

Option EK2 (permanent grassland with low inputs) limits the amount of inorganic nitrogen fertiliser to 50 kg/ha nitrogen per year (100kg total including organic manures, whilst EK3 (permanent grassland with very low inputs) does not allow for any inorganic N input, though up to 12.5 tonnes per year of farmyard manure (FYM) may be applied per year if the grass is regularly cut. Options OK2 and OK3 both allow application of up to 12.5 tonnes of FYM.

Comparison between 2005/6 and 2011

Analysis here has concentrated on aspects likely to be directly affected by management under the prescription. Aspects related to sward quality (e.g. species richness) are unlikely to have changed over the life of an agreement. These are analysed below in comparison with control fields, and also in phase 2.

3.3.7.1 Soil condition

Some evidence of compaction was noticed in 6 out of 25 fields in option EK2 in 2011. None was recorded in 2005/6. A chi-square test indicated a significant difference between the years at P=0.009. Seven out of 36 fields in option EK3 showed evidence of compaction in 2005, and nine in 2011. There was no significant difference between these frequencies in the two years.

Four of the 25 fields in EK2 showed evidence of waterlogging in 2005/6 and one in 2011. For EK3, two fields were waterlogged in 2005 and none in 2011. There was no significant difference between the years for either option.

3.3.7.2 Supplementary Feeding

Supplementary feeding was recorded in two instances in 2005/6, both next to watercourses. Two different occurrences were recorded in 2011, one of which was near a footpath and one of which was on a steep slope.

Comparison between features in options and control features (not in ELS)

3.3.7.3 Species richness

Numbers of plant species were counted in five 1 m^2 quadrats per field. Average numbers per quadrat were analysed by REML variance components analysis, with farm as a random variable, to investigate differences between options and controls. Total number of species observed was analysed by regression with a poisson distribution and log link.

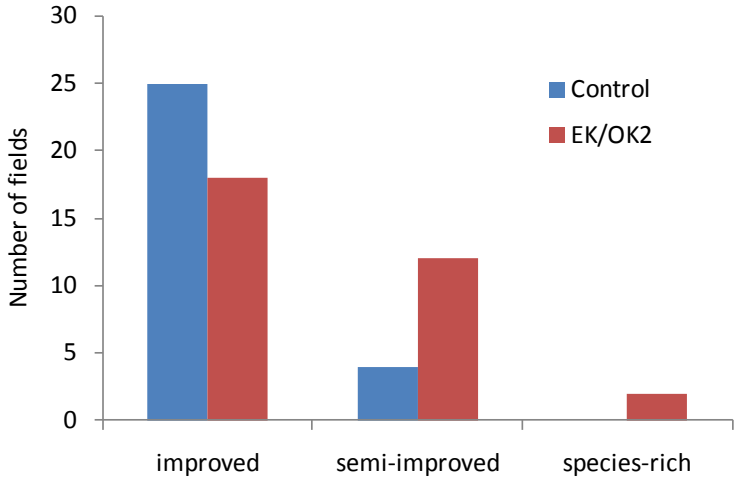
There was a significant effect of treatment (option/control) at P<0.001 for average numbers of species per quadrat. There was also a significant effect of farm at P<0.001. The estimated average species number for control fields was 6.7 ± 1.4, compared to 8.1 ± 1.5 for EK/OK2 and 8.8 ± 1.9 for EK/OK3.

There was also a significant effect of treatment on total numbers of species recorded (P=0.001). Estimated total species number for control fields was 30.8 (confidence interval, CI, 24.9-39.1), compared to 37.8 (CI 30.2-47.3) for EK/OK2 and 42.0 (CI 31.9-55.2) for EK/OK3.

3.3.7.4 Broad grassland type (improvement status)

Grasslands recorded in 2011 were classified using the key provided in the Farm Environment Plan (FEP) handbook[8] to determine whether they were improved (species-poor), semi-improved or species-rich. A chi-square test was used to see whether there was a significant difference in frequency of semi-improved/species rich swards between fields in options EK/OK2 and EK/OK3 and controls. There were too few species rich swards to include as a separate category in the analysis, so these were amalgamated with semi-improved swards to compare with improved (species-poor) grasslands.

(a)



(b)

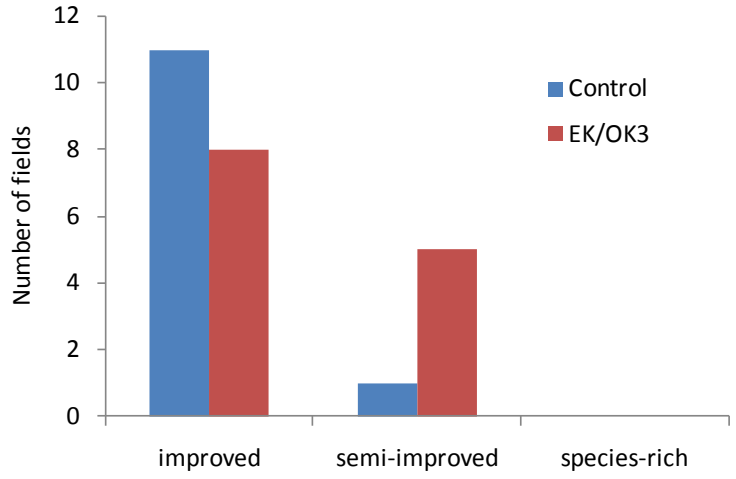


Figure 20. Frequency of occurrence of improved, semi-improved and species-rich swards in grasslands managed as ELS/OELS options compared to controls on the same farms. (a) EK/OK2; (b) EK/OK3.

[8] Third edition, March 2010, page 61.

There was a significant difference (P = 0.01) between EK/OK2 and controls in the frequency of semi-improved or species-rich swards, with a higher proportion of swards falling into this category when they were in an ELS/OELS option. There was also a higher frequency of semi-improved or species-rich swards in EK/OK3 than in control fields on the same farms, but the sample size was low and the difference was not statistically significant (P= 0.078) (Figure 20).

3.3.7.5 Sward height

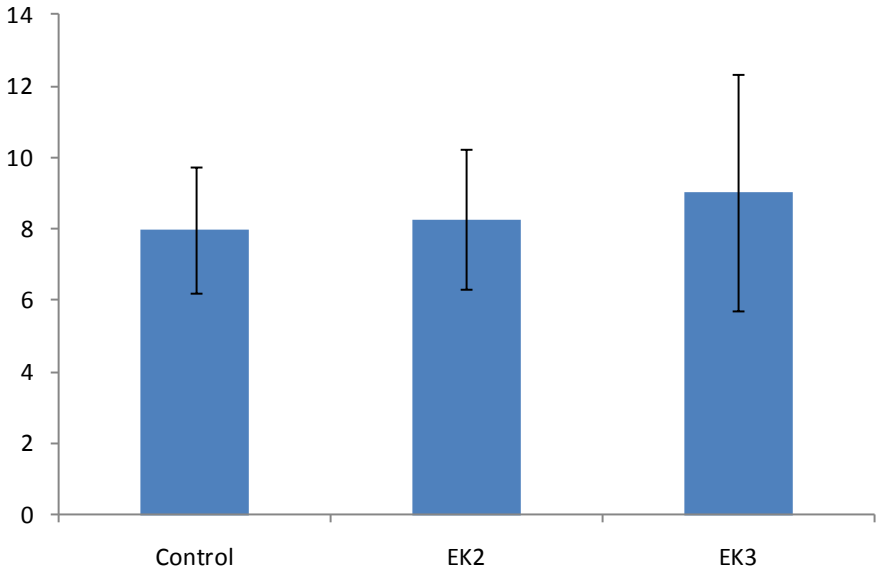


Figure 21. Mean height of swards (cm) in options EK2 and EK3 compared to control fields, with 95% confidence intervals.

The height of the sward in grazed fields was recorded using a drop disc (30 cm diameter, 200 g weight) at 20 locations, dropping the disc from one metre. There was little difference in mean sward height between control fields, and fields in options EK2 and EK3 (Figure 21). Mean grass height was slightly greater in EK3, but variation between swards was large and the difference was not statistically significant. There was a significant difference between farms at p<0.001.

3.3.7.6 Other attributes

A number of other attributes were recorded but no differences between control fields and those in options were slight apart from poaching and supplementary feeding, which were observed in a higher proportion of fields in options than in control fields. These attributes are summarised in Table 41.

Table 41. Additional attributes of EK2 and EK3 grasslands and control fields.

Attribute	Control		Option	
	No	Yes	No	Yes
Presence of archaeological feature	35	7	37	8
Near archaeological feature	32	0	44	1
Near footpaths	41	1	44	1
Near steep slopes	42	0	43	2
Near watercourses	42	0	45	0
Soil compaction	39	3	42	3
Waterlogging	39	3	42	3
Poaching	39	3	31	14
Supplementary feeding	40	1	37	8

4 RESULTS – PHASE 2

The second phase of the study assessed attitudes of farmers, management and condition of features for those entering new agreements during 2010-2012 to assess the likely environmental benefits arising from these agreements. The sample included those that were renewing agreements (including some from Phase 1) and some that had no previous agreement. Farmers renewing were stratified by those that had received ETIP advice and those that had not in order to assess the role of ETIP in influencing farmer attitudes and factors affecting option selection and, for some options its placement. Questions were asked through a postal questionnaire and a visit interview and a field survey of all farmers that were interviewed was undertaken.

4.1 Postal questionnaire – Agreement holders

This postal questionnaire aimed to establish background information on farms, assess attitudes to the environment and the impact of ES at a national and individual farm scale and to explore any differences between those who had and had not received ETIP advice. A sample for visits was selected from the responses to this questionnaire.

4.1.1 Environmental issues affecting agricultural land

Resource protection and pollution was the most common concern amongst farmers with more than half of respondents (56%) identifying it as an issue affecting agricultural land (Table 42). A large proportion of farmers (40%) also referred to issues concerning preservation of wildlife habitat and biodiversity, whilst only four farmers (3%) considered pests and weeds to be a key issue. Seven farmers made comments that fell into the 'other' category, three of which felt there were no key issues whilst others voiced concerns over the scheme structure, such as "top down prescriptive measures" and larger farms getting a disproportionate amount of money.

Table 42. Key environmental issues affecting agricultural land.

Category	n=126	%
Resource protection and pollution	71	56
Preservation of wildlife habitat and biodiversity	51	40
Sustainability	17	13
Climate change	11	9
Historic environment	10	8
Urban development and public activity	8	6
Pests and weeds	4	3
Other	7	6

4.1.2 Conservation work on the farm

A total of 85 farmers (56% of those that answered the question) were undertaking some form of conservation work not covered by an existing agreement. Those that had received ETIP advice were more likely (63%) than those that had not (45%) to be carrying out conservation work outside of an agri-environment agreement (Table 43).

Table 43. Conservation work undertaken outside an agri-environment scheme.

	ETIP (n=54)		Non-ETIP (n=53)		ETIP Unknown (n=44)		Total (n=151)	
	n=54	%	n=53	%	n=44	%	n=151	%
Yes	34	63	24	45	27	61	85	56
No	20	37	29	55	17	39	66	44

Further details of conservation work were provided by 83 farmers. Tree/woodland and hedgerow management were the most common types of work undertaken by farmers who gave details of voluntary work (Table 44). Over a quarter of farmers (28%) were undertaking management of ponds/wetlands. Fewer than 5% of farmers were managing stone walls, grasslands, historic or organic features.

Table 44. Types of habitats/features managed outside agri-environment agreements.

Category	n=83	%
Tree planting/tree preservation/woodland management	37	45
Hedgerow planting/management/restoration	28	34
Pond/wetland creation/maintenance	23	28
Buffer strips, beetle banks, field corner management	16	19
Bird conservation	14	17
Wildlife habitat provision and conservation planting	11	13
Stone wall and/or fence building/maintenance/restoration	3	4
Grassland management	2	2
Organic requirements	2	2
Historic feature building maintenance/restoration	2	2
Other	5	6

4.1.3 National objectives of ES

Farmers were asked what they regarded as the most important objectives of the (O)ELS scheme nationally. (Figure 22).

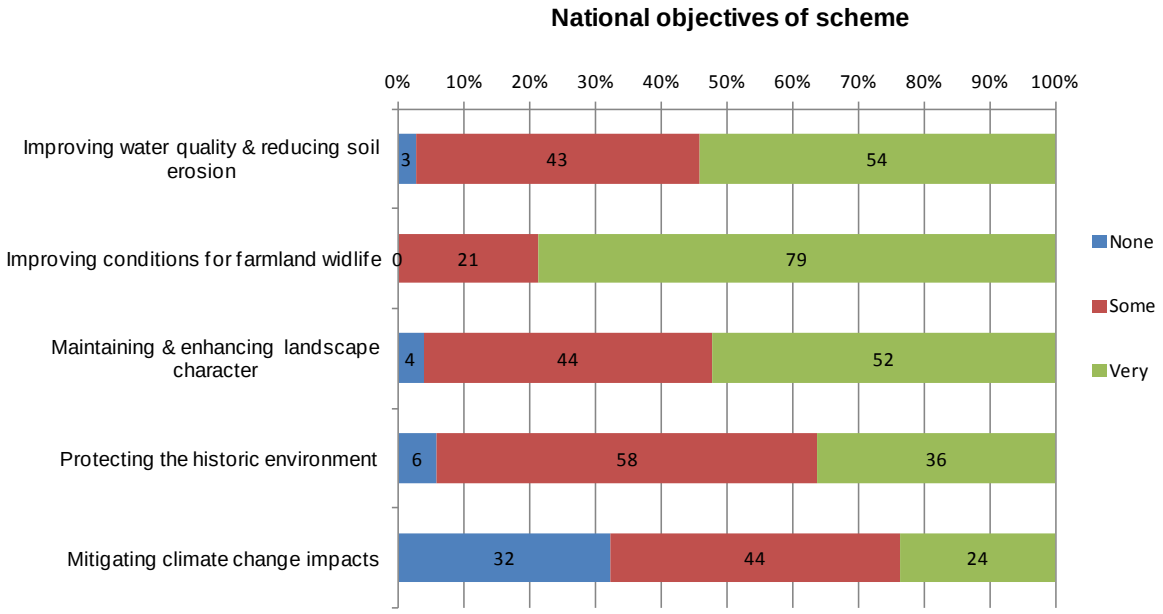


Figure 22. National importance of different objectives.

'Improving conditions for farmland wildlife' was regarded as the most important objective, with 79% of farmers considering it 'very important' and none considering it as 'no importance'. 'Mitigating climate change impacts' was regarded as the least important objective with only 24% of respondents considering it 'very important' and 52% regarding it with 'no importance'. 'Improving water quality & reducing soil erosion' and 'Maintaining & enhancing landscape character' were regarded with near equal importance by farmers, with more than 50% of respondents considering both objectives 'very important' and more than 40% regarding them with 'some importance'

Eight farmers gave details of 'other' objectives they considered important nationally. Four thought the scheme helped farmers farm sustainably and a two thought it supported the rural economy. One farmer simply reiterated the benefits to biodiversity and another believed it was changing farmer attitudes.

Table 45. Importance of scheme objectives nationally for farmers who had received ETIP advice and those that had not.

Category	ETIP	Non-ETIP	ETIP Unknown	Total
Improving water quality and reducing soil erosion				
n	56	52	45	153
None	4%	2%	2%	3%
Some	43%	50%	36%	43%
Very	54%	48%	62%	54%
Improving conditions for farmland wildlife				
n	57	53	45	155
None	0%	0%	0%	0%
Some	25%	13%	27%	21%
Very	75%	87%	73%	79%
Maintaining & enhancing landscape character				
n	57	53	45	155
None	7%	4%	0%	4%
Some	39%	51%	42%	44%
Very	54%	45%	58%	52%
Protecting the historic environment				
n	56	53	43	152
None	9%	8%	0%	6%
Some	55%	53%	67%	58%
Very	36%	40%	33%	36%
Mitigating climate change impacts				
n	55	53	44	152
None	33%	32%	32%	32%
Some	45%	36%	52%	44%
Very	22%	32%	16%	24%

There were few differences in the proportions of farmers who had received ETIP advice and those that had not in how important the different objectives were considered at a national scale (Table 45). A slightly higher proportion of those that had not received ETIP advice compared to those that had, considered farmland wildlife and mitigating climate change as very important objectives. The reverse was true for landscape, although again differences were small.

4.1.4 Scheme objectives on your farm.

Farmers were also asked what they regarded as the most important objectives of (O)ELS, in relation to their farm. 'Improving conditions for farmland wildlife' was again the most highly

regarded objective, with 76% of farmers regarding it as 'very important' and only 1 farmer (n=155) regarding it with 'no importance' (Figure 23). 'Mitigating climate change impacts' was, again, considered least important, with only 21% of farmers regarding it as 'very important' and 39% regarding it as 'not important'. 'Maintaining & enhancing landscape character' and 'Improving water quality & reducing soil erosion' were again considered to have similar importance. The overall response was very similar to 'National objectives of the scheme', with slightly greater proportions of farmers regarding the objectives with 'no importance' and slightly smaller proportions regarding the objectives as 'very important'. The greatest difference in perceived importance was for 'Protecting the historic environment' with 22% more farmers considering it of no importance at the farm level compared to the national level and 10% fewer considering it 'very important' at the farm level. It would appear that farmers largely regard the scheme objectives to be of similar relative importance on a national scale as on the individual farm scale, but generally objectives were considered more important at the national level.

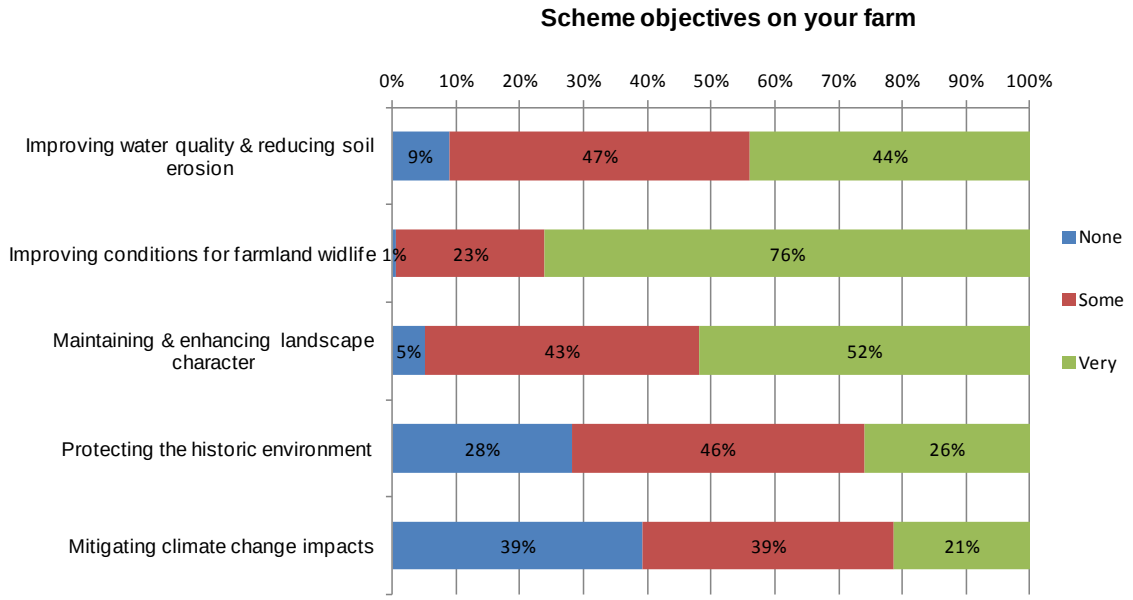


Figure 23. Importance of scheme objectives on the farm.

Eight farmers detailed 'other' objectives they considered important in relation to their farm. Four thought the scheme provided farmers with financial support and two thought it protected the historical and cultural environment. One farmer again reiterated benefits to biodiversity and another believed it was helping farmers to farm sustainably. It would appear that for a small group of farmers, the most important objective shifts from sustainable farming at a national scale, to financial support at the individual farm scale.

There were very few differences in farmers' views of the different objectives in relation to ETIP advice (Table 46). The historic environment and mitigating climate change were slightly more likely to be considered very important by those that had not received ETIP advice.

Table 46. Importance of scheme objectives at the individual farm level.

Category	ETIP	Non-ETIP	ETIP Unknown	Total
Improving water quality and reducing soil erosion				
n	54	51	41	146
None	6%	10%	12%	9%
Some	54%	47%	39%	47%
Very	41%	43%	49%	44%
Improving conditions for farmland wildlife				
n	56	54	45	155
None	0%	2%	0%	1%
Some	23%	22%	24%	23%
Very	77%	76%	76%	76%
Maintaining & enhancing landscape character				
n	56	54	44	154
None	5%	6%	5%	5%
Some	45%	44%	39%	43%
Very	50%	50%	57%	52%
Protecting the historic environment				
n	52	53	41	146
None	35%	34%	12%	28%
Some	44%	36%	61%	46%
Very	21%	30%	27%	26%
Mitigating climate change impacts				
n	50	53	42	145
None	42%	36%	40%	39%
Some	46%	36%	36%	39%
Very	12%	28%	24%	21%

4.1.5 Approach to (O)ELS

A total of 128 farmers gave their opinion on the most positive aspects of (O)ELS. The most common opinion shared amongst 41% of farmers was that the scheme creates/preserves wildlife habitats and biodiversity (Table 47). Over a quarter of farmers (27%) believed it provides financial opportunity to address environmental issues. Only 10% of farmers considered the protection and preservation of the historic landscape and environment to be the most positive aspect of (O)ELS. A total of 7 farmers (5%) made comments that fell into the 'other' category, which included the benefits of the "broad and shallow approach", and one farmer believing it "gave security of tenure" as it "demonstrated commitment to the landlord".

Table 47. Most positive aspects of (O)ELS.

Category	n=128	%
Creates/preserves wildlife habitats and biodiversity	53	41
Provides financial backing/incentive and opportunity to address environmental issues	34	27
Raises awareness and changes farmer and public attitudes	16	13
Protects resources and reduces pollution	15	12
Easy to implement and causes minimal disruption to farming activities	14	11
Protects and preserves our historic landscape and environment	13	10
Other	7	5

Negative aspects of (O)ELS were detailed by 116 farmers. The most commonly shared opinion (22%) was that there were no negative aspects to (O)ELS. The same proportion of farmers (15%) that found the scheme too bureaucratic and complicated also found it had inflexible regulations, compliance and restrictions (Table 48). Fewest considered the loss of production to be a particularly negative aspect of the scheme, with only 6 farmers making comments that fell within this category. Other concerns included one farmer who thought that there was a lack of P.R. and there were "confused messages" about the scheme. Another thought that getting the landlord to agree to a five year agreement was the most negative aspect.

Table 48. Most negative aspects of (O)ELS.

Category	n=116	%
No negative aspects	25	22
Too bureaucratic and complicated	17	15
Inflexible regulations, compliance and restrictions	17	15
Issues with particular options	15	13
Scheme structure, application and focus	13	11
Scheme points, payments and value	10	9
Public access onto strips	9	8
Reduction in production	6	5
Other	5	4

Fourteen farmers gave details of difficulties they had encountered during their previous agreement. Administrative issues such as agreement changes, points targets and rented land, was the most common problem experienced (Table 49). Weed control and weather conditions were also mentioned.

Table 49. Difficulties arising from the original (O)ELS agreement.

Category	n=14	%
Agreement broken or needed changing	6	43
Problems controlling weeds	3	21
Problems with unseasonal weather	2	14
Other	3	21

4.1.6 Impact on the farming system

A total of 137 farmers described the impact of joining (O)ELS on their farm system. Farmers most commonly considered their agreement to have had little or no impact or indeed to have had a positive impact on their farming system (69% of respondents) (Table 50). Only 9% of farmers thought the scheme had a negative impact on the farming system and only one farmer thought it had a negative impact on wildlife because they felt it had "sadly increased fly tipping and travellers grazing horses on grass margins". Only 3% of farmers made comments that fell into the 'other' category, including one farmer who said they were now "producing less food for human consumption" and another farmer who said it made the farm "look less tidy".

Table 50. Impact of joining the (O)ELS scheme on the farming system.

Category	n=137	%
No impact on farming system	33	24
Positive impact on farming system	33	24
Negligible impact on farming system	29	21
Positive impact on wildlife, environment and biodiversity	21	15
Created greater awareness of the environment	19	14
Negative impact on farming system	13	9
Negative impact on wildlife, environment and biodiversity	1	1
Other	4	3

4.1.7 Payment rates

The vast majority of farmers (82%) considered the cost of implementing their original (O)ELS agreement to be covered by the payment rates (Table 51).

Table 51. Do you think the cost of implementing your original (O)ELS agreement on your farm was covered by the payment rates?

	ETIP		Non-ETIP		Unknown		Total	
	n=54	%	n=51	%	n=45	%	n=150	%
Yes	44	81	40	78	39	87	123	82
No	10	19	11	22	6	13	27	18

Of the 27 farmers that did not consider costs to be covered, 25 gave further information. Cost associated with hedgerow management was the most common aspect not covered by scheme payments (Table 52). One fifth of these farmers felt that costs associated with loss of stock feed were not met by the scheme. A further 20% felt that the scheme did not meet costs associated with seed mixtures and loss of productive land.

Table 52. Aspects of implementing the previous agreement that were not met by scheme payments.

Category	n=25	%
Costs associated with hedgerow management	6	24
Costs associated with loss of stock feed	5	20
Costs associated with loss of productive land	5	20
Cost of seed mixtures	5	20
Costs associated with fencing options	3	12
Costs associated with increase labour	3	12
Other	3	12

4.1.8 Points allocations

Only 14 farmers suggested options where they felt the points allocated to be either too low or generous, seven of whom suggested more than one option. The majority of farmers considered the points allocation too low for the options they suggested (Table 53). Permanent grassland with low inputs was the option considered by most farmers to be both too low and generous. Enhanced hedgerow management was the only other option considered to be generous, with no farmers considering them too low. Points were considered too low for field corners, sown mixes and arable options.

Table 53. Inappropriate points allocations.

Option		**n=14**	
		Too low	**Generous**
EA1	Farm environment record	1	
EB	Options for boundary features	1	
EB1	Hedgerow management on both sides of a hedge	2	
EB3	Enhanced hedgerow management		1
EB11	Stone wall protection and maintenance	1	
EE3	6m buffer strips on cultivated land	1	
EF1	Management of field corners	2	
EF2	Wild bird seed mixture	2	
EF4	Nectar flower mixture	2	
EF6	Overwintered stubble	1	
EF8	Skylark plots	1	
EF10	Unharvested cereal headlands	1	
EJ13	Winter cover crops	1	
EK1	Take field corners out of management	1	
EK2	Permanent grassland with low inputs	3	2
EK5	Mixed stocking	1	

4.1.9 Attitude to environmental schemes

Of the 155 farmers who responded, none felt less positive towards environmental protection/conservation as a result of participating in (O)ELS. Over half (62%) of the respondents felt more positive and 38% felt about the same (Table 54). A slightly higher proportion of farmers who had received ETIP felt more positive about environmental protection/conservation, than those who had not.

Table 54. Effect of scheme membership on attitudes to environmental protection/conservation.

Category	ETIP		Non-ETIP		Unknown		Total	
	n=58	%	n=52	%	n=45	%	n=155	%
Less positive	0	0	0	0	0	0	0	0
About the same	17	29	21	40	21	47	59	38
More positive	41	71	31	60	24	53	96	62

4.1.10 Previous agri-environment agreements

A total of 94 farmers indicated the type of agri-environment agreement they previously had on the holding (Table 55). The 33 farmers who were also part of the phase 1 sample were not asked this question. ELS was the most common type of previous agri-environment agreement (82% of those that answered this question), although 24% had a previous CSS agreement. Only ten of those that responded had a previous OELS, HLS or ESA agreement. The proportion of farmers with a previous ELS agreement was slightly lower for those that had received ETIP advice compared to the Non-ETIP group. The ETIP group was more likely to have had OELS and CSS agreements compared to those that had not received ETIP advice.

Table 55. Previous agri-environment agreements.

Agreement type	ETIP (n=44)		Non-ETIP (n=24)		ETIP Unknown (n=26)		Total (n=94)	
	n	%	n	%	n	%	n	%
ELS	36	82	23	96	18	69	77	82
OELS	5	11	0	0	2	8	7	7
HLS	1	2	0	0	0	0	1	1
CSS	12	27	4	17	7	27	23	24
ESA	0	0	0	0	2	8	2	2

Only 14 farmers of 133 who answered the question indicated that they had encountered difficulties with their original (O)ELS agreement (Table 56). One farmer said a third party had broken the agreement, another said they had difficulties establishing field corners and

headlands whilst others commented on weed control, the unseasonable weather and changes they had to make to their schemes for which they were penalised.

Table 56. Difficulties with the original (O)ELS agreement.

	ETIP (n=55)		Non-ETIP (n=48)		ETIP Unknown (n=30)		Total (n=133)	
	n	%	n	%	n	%	n	%
Yes	5	9	7	15	2	7	14	11
No	50	91	41	85	28	93	119	89

4.1.11 Impact of previous agreement on individual farms.

Farmers were asked how effective they felt the objectives of the scheme had been on their farm. 'Improving conditions for farmland wildlife' was the objective that farmers regarded as being most effective with the largest proportion of farmers (55%) considering it to be 'Very effective' and the smallest proportion of farmers (4%) considering it 'Not effective' (Figure 24). 'Mitigating climate change impacts' was the objective respondents considered least effective on their farm, with the smallest proportion of farmers (14%) considering it 'very effective' and the largest proportion of farmers (53%) considering it 'not effective'. The results mirrored those of 'National objectives of scheme' and 'Scheme objectives on your farm'. Objectives currently considered to be most 'effective' by farmers, were also considered most important for the previous agreement.

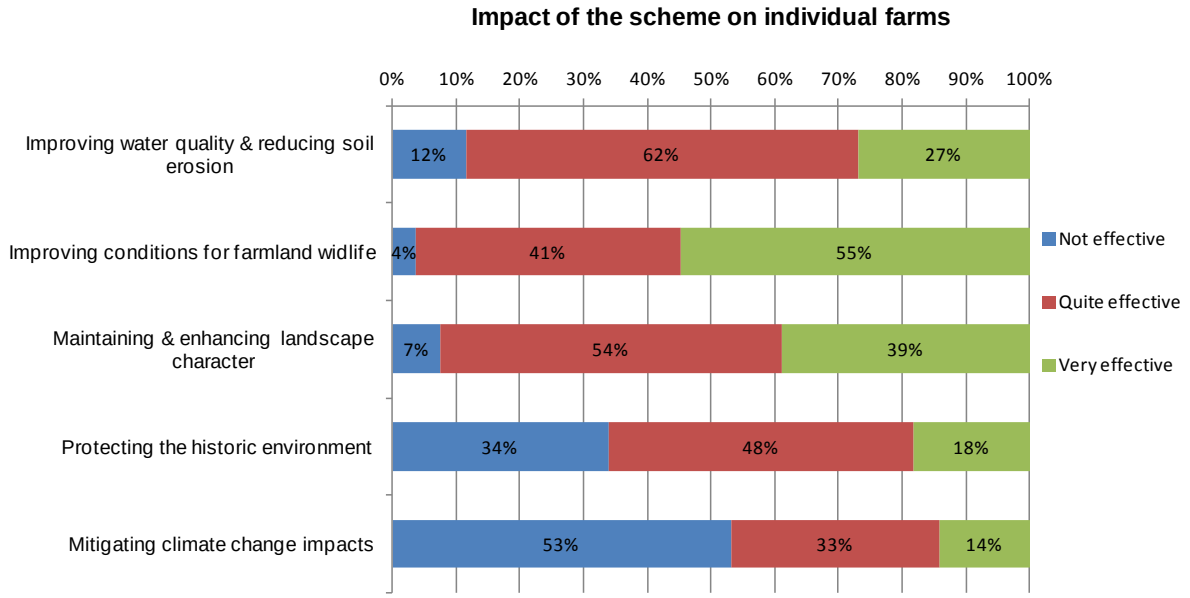


Figure 24. Effectiveness of the previous (O)ELS agreement.

Only three farmers mentioned other factors. Two farmers felt they were unable to comment, one of whom suggested the weather was more important. Another farmer believed it had made no difference as he always farmed to protect wildlife and the environment.

There were no apparent differences between those that had received ETIP advice and those that had not in farmers' consideration of the effectiveness against individual objectives (Table 57).

Table 57. Effectiveness of previous (O)ELS agreements against different objectives.

Category	ETIP	Non-ETIP	Unknown	Total
Improving water quality and reducing soil erosion				
n	54	48	28	130
Not effective	7%	19%	7%	12%
Quite effective	69%	58%	54%	62%
Very effective	24%	23%	39%	27%
Improving conditions for farmland wildlife				
n	55	50	30	135
Not effective	0%	8%	3%	4%
Quite effective	47%	40%	33%	41%
Very effective	53%	52%	63%	55%
Maintaining & enhancing landscape character				
n	54	50	30	134
Not effective	6%	8%	10%	7%
Quite effective	59%	58%	37%	54%
Very effective	35%	34%	53%	39%
Protecting the historic environment				
n	52	47	28	127
Not effective	37%	36%	25%	34%
Quite effective	52%	45%	46%	48%
Very effective	12%	19%	29%	18%
Mitigating climate change impacts				
n	51	49	28	128
Not effective	59%	47%	54%	53%
Quite effective	35%	35%	25%	33%
Very effective	6%	18%	21%	14%

4.2 Postal questionnaire – Non-participants

The postal questionnaire of farmers with no current ES agreement explored these farmers' awareness of and attitudes to ES schemes and environmental issues and established barriers to ES uptake. The returns were used to select a sample for field survey.

A total of 74 questionnaires were returned. Most farmers who did not have an agri-environment agreement were aware of ES schemes, although a slightly smaller proportion (75%) of farmers were aware of the organic scheme (Table 58).

Table 58. Awareness of Defra Environment Stewardship schemes.

	n	No	Yes	% Yes
ELS	70	6	64	91
OELS	69	17	52	75
HLS	69	9	60	87

Farmers were asked where they had obtained information about Environmental Stewardship from. Of the 73 who answered this question, twelve had obtained no information, although eight of these were aware of at least some elements of ES. Of the 61 farmers who had obtained information, most common sources were the farming press and scheme handbooks (Table 59). Only 14 farmers had obtained information in person through a meeting or an adviser.

Table 59. Sources of information on Environmental Stewardship.

Category	Yes (n=61)	%
Farming press	46	75
Scheme handbooks	37	61
Natural England leaflets	10	16
Natural England website	9	15
Natural England meetings/workshops	7	11
Local press	7	11
Natural England adviser	6	10
Other organisations' information	5	8
Other adviser/consultant	4	7
Radio	2	3
Other farmer meetings/workshops	1	2
Other	1	2

Thirteen farms (18%) had previously had an agri-environment agreement, most of which had been ELS (10 farms). Only four farmers indicated that experience with a previous agreement (all ELS) affected their decision not to apply for a current agreement. One farmer

thought the payment did not adequately compensate for the restrictions, another was unable to reach the points target, one did not want restrictions on selling land and the fourth landowner (an animal sanctuary) did not understand the scheme which was set up by the previous owner.

Similar to farmers with ES agreements, non-participant farmers considered resource protection and pollution, sustainability and biodiversity to be the most important environmental issues affecting agricultural land (Table 60). However, sustainability was considered important by a larger proportion of non-participants (27%) than participants (13%; Table 42).

Table 60. Key environmental issues affecting agricultural land.

Issues	n=43	%
Resource protection and pollution	13	30
Sustainability	12	27
Preservation of wildlife habitat and biodiversity	10	23
Weed and pest management	4	9
Climate change	4	9
Bureaucracy	3	7
Unbalanced predator/prey relationships	2	5
No issues	2	5
Other	5	11

A total of 40 farmers (59% of those that answered the question) were undertaking some form of conservation work. These results are similar to participant farmers of whom 56% were undertaking voluntary environmental management (Table 43). Seven of the non-participant farmers (18%) were undertaking this work as part of the Campaign for the Farmed Environment. Similar to the results for participant farms (Table 44) tree/woodland and hedgerow management were the most common types of work undertaken (Table 61). Around one quarter of those who gave details of conservation work were undertaking management of ponds/wetlands and of uncropped areas (buffer strips etc.).

Table 61. Types of conservation work undertaken on non-participant farms.

Conservation work	n=39	%
Tree planting/tree preservation/woodland management	18	46
Hedgerow planting/management/restoration	16	41
Pond/wetland creation/maintenance	11	28
Buffer strips, beetle banks, field corner management	9	23
Wildlife habitat provision and conservation planting	6	15
Grassland management	5	13
Stone wall and/or fence building/maintenance/restoration	4	10
Bird conservation	3	8
Organic requirements	2	5
Historic feature building maintenance/restoration	2	5
Other	5	13

Most farmers without an agri-environment agreement were supportive of Defra funding ES schemes (79% n=56). The most common reasons for supporting ES were the environmental benefits and the payments for environmental work (Table 62). Only eight farmers gave reasons for not supporting ES schemes, generally because they thought it was an inappropriate use of money. One farmer considered environmental management to be an integral part of farming.

Table 62. Reasons for supporting ES schemes.

Category	n=26	%
Encourages uptake and helps compensate farmers' efforts	9	35
Benefits the natural environment	9	35
Financial support to the farming community/enterprises	4	15
Encourages responsible farming	1	4
Other	3	12

Over half of those who gave reasons for not currently participating in ES gave more than one reason. The five year agreement period and complexity of the scheme were the most commonly cited reasons (Table 63). Three farmers who indicated that the payment rate was too low suggested that payment would need to be between 40% and 100% greater than current rates to persuade them to participate. Fourteen farmers thought that ES would not fit with their current farming system. This was generally because the farm was too small, they could not comply with prescriptions or because they did not want to take land out of production.

Table 63. Reasons for currently not participating in Environmental Stewardship.

Category	n=69	%
I didn't want to be tied into a scheme for 5 years	22	32
The scheme was too complicated	20	29
It would not fit in with my current farming system	14	20
The payment rate for ELS/OELS was too low	13	19
I was not interested	13	19
I thought it would be difficult to reach my points target	11	16
The forms were too complicated	9	13
There was not enough guidance from advisers	5	7
My tenancy is for less than 5 years and my landlord was not prepared to countersign the application form	3	4
Already in another scheme and didn't want/can't apply for two schemes on the farm	1	1
Other	16	23

Fifty seven percent (n=65) of non-participants indicated that they would consider applying for ES in the future. Reasons given for not applying by those who would consider applying in the future are presented in Table 64. Six had been too busy to apply and five were put off by the complexity of the paperwork and did not understand the scheme (Table 64).

Table 64. Reasons for not having applied already.

Category	n=25
Have not found the time	6
Put off by the paperwork and do not understand the scheme	5
Change in farm ownership and structure	3
Have not been able to make up the points	3
Financial reasons	2
Did not want to be tied to the scheme for five years	2
Other	4

Of the 25 farmers who would not consider applying for ES who gave further information, seven (28%) considered the scheme inappropriate for their farm, usually because the farm was small (Table 65). Six farmers were concerned about compliance or the level of bureaucracy and four were simply too elderly.

Table 65. Reasons for not considering applying for ES.

Category	n=25
Farm size and type are not applicable to scheme	7
Concerned about paperwork and compliance	6
Concerned about age and health	4
Disagree with the scheme	2
Concerned about implications with potential CAP reforms	2
Financial reasons	2
Other	2

4.3 Farmer interviews – Generic questions

Interviews were conducted with agreement holders to establish whether there had been any changes in option selection (for those with a previous ES agreement) or in management of features. The environmental importance of options, their impact on the farm and system and the provision of advice were also explored. This information was used to ascertain any differences between those that had received ETIP advice and those that had not.

The data from the Generic Questionnaires has been analysed to compare the responses from the 60 farms receiving ETIP advice with the 54 farms which are known not to have been involved in ETIP. In addition there was a further group of 46 farms for which the ETIP status was unknown; these included six farms from the original baseline survey, 22 phase 2 renewals and 18 first-time agreements (based on information received from farmers at interview).

4.3.1 Options dropped on renewal of O/ELS agreements

Table 66. Number of farms that dropped options from their agreement on renewal.

	ETIP		Non-ETIP		ETIP unknown		All Farms	
Farms with dropped options	25	42%	20	37%	11	39%	56	39%
Farms with no dropped options	35	58%	34	63%	17	60%	104	61%
Total	**60**		**54**		**28**		**142**	

Changes which were from organic to the equivalent conventional option were excluded from this analysis.

Overall 39% of farmers dropped at least one option at renewal. 95 options were dropped, of which 37 came from ETIP farms and 41 from farms without ETIP.

There was no statistically significant difference in the proportion of farms with dropped options between ETIP and non-ETIP (chi square test). The proportions for the ETIP unknown category were very similar to those for the sample as a whole. Overall 58% of the

options dropped were priority options, 42% were non-priority options. The proportions on ETIP farms were very similar with 59% of options dropped being priority options.

Hedge, ditch and hedge/ditch options

30% of options dropped were those concerned with hedges, hedge banks, ditches or hedge/ditch combinations. Of these 11 were on ETIP farms and 13 on non-ETIP farms. The enhanced hedge options dropped were all on non-ETIP farms.

One ETIP farm dropped 6 different hedge, ditch and hedge/ditch options because of the change in date when cutting of hedges and ditch banks could commence from the end of July to the end of August.

Fifteen single and double-sided hedge or hedge/ditch options were dropped (E/OB1,2,8,9), of which 9 were ETIP and 4 were non-ETIP. Four were dropped because of the timing issue from the same farm mentioned above. Of the others, seven were dropped because farmers felt it necessary to return to an annual cut; in four cases this involved roadside hedges, two of which were changes from double-sided options to single-side options. There was one instance of a double-sided hedge being changed to an enhanced hedge code, and another where it was indicated that management would not change.

There were four instances of enhanced hedge options (EB3, OB10) being dropped; two were changed to EB1/OB1 so they could be cut more frequently, another was being left uncut and on one the management was being left unchanged. All four were on non-ETIP farms.

Five ditch options were dropped (E/OB6,7) of which 2 were ETIP, 3 Non-ETIP. Two options were dropped because of timing, one was a change from a ditch to a ditch/hedge option (OB6 to OB9), and the other two indicated no change in management.

Table 67. Options dropped on renewal of O/ELS agreement (priority options in bold).

Feature	Option	ETIP	No ETIP	ETIP Unknown	Total	% of total
Hedges	E/OB1&2,E/OB4	7	4	3	14	15%
Ditches	**E/OB6,7**	2	3	0	5	5%
Hedge/Ditches	E/OB8,9,10	2	2	2	6	6%
Enhanced hedges	**E/OB3**	0	4	0	4	4%
In-field Trees	E/OC1&2	1	3	1	5	5%
Wood fence/edge	**E/OC3&4**	5	3	1	9	9%
Buffers arable	E/OE2&3	1	3	1	5	5%
Buffers grass	E/OE5,6	3	1	0	4	4%
Buffers ponds	E/OE7	0	1	0	1	1%
Stubble/cereals	**E/OF6,E/OG1,E/OG4**	6	1	3	10	11%
Field corners	**E/OF1,E/OK1**	3	1	1	5	5%
WBSM/P&N	**E/OF2&4**	1	4	1	6	6%
Skylark plots	**E/OF8**	2	0	0	2	2%
Grassland	**E/OD5**,**E/OK2,3**,	3	8	2	13	14%
Grassland SDA & mix stock	E/OK5,E/OL2	1	3	2	6	6%
Total priority options		**22**	**25**	**8**	**55**	**58%**
Total non-priority options		15	16	9	40	42%
Totals		**37**	**41**	**17**	**95**	**100%**

There was no statistically significant difference in the proportion of farms with dropped options between ETIP and non-ETIP (chi square test).

In-field Trees

Five in-field tree options were dropped, one ETIP and three non-ETIPs, one on arable, four on grass. In one case it was because the farmer didn't want to leave fallen branches in the field. In the other cases, no reason was given but it was indicated that management would not change.

Woodland fences and edges

There were six woodland fence options dropped, four of which were on ETIP farms. In one case it was because the fence did not qualify, one had been replaced with a deer fence, the other three indicated that management would not change.

There were three instances where the woodland edge option was changed, one of which was on an ETIP farm. In one case (ETIP) the field had been reinstated to a previous boundary; in the others there was no change in management. One farmer (non-ETIP) was concerned because it was hard to distinguish the position of the original woodland edge causing him to drop the option to avoid dispute.

Buffers

One arable buffer (EE2, non-ETIP) was dropped because the field had been removed from the agreement to reduce the overall points required - the buffer itself was retained.

Three farms dropped some of their 6m buffers from arable fields (EE3, 1 ETIP, 2 non-ETIP); in two cases this was because they wanted to be able to drive on them, in the other because unauthorised horse-riders were using them.

One farm (ETIP) dropped some of their 4m and 6m buffers from grass fields (EE5, EE6) because of weed problems. Another ETIP farm dropped some 6m buffers because they wanted to be able to park machinery on them, but retained riverside ones. A third ETIP farm dropped their OE6 buffers but indicated that management would not change.

Stubbles

Five farms, all ETIP, dropped over-winter stubbles (EF6). In two cases there was a reduction in area but some OWS was retained. One farm had retained their OWS, but taken it out of ELS so that they had more flexibility over ploughing date. One farm did not intend retaining any stubbles over-winter in their second agreement. The fifth had dropped EF6 but taken up the extended over-winter stubble option (EF22).

One farm (non-ETIP) dropped under-sown spring cereals (OG1) and was leaving the field as grass. Another dropped the option EG4 Cereals for whole-crop silage followed by overwintered stubble, because he found that it didn't fit in with his normal farm practice.

Field corners

Two farms, both ETIP, dropped field corners in arable fields (EF1). In one case they were ploughed up and incorporated back into the field, in the other where they occurred next to woodland, they were re-categorized as very low input grassland (EK3).

Two farms dropped field corners from grass fields (EK1/OK1). At one ETIP farm, this was because the farmer felt it needed grazing; at the other non-ETIP farm, no reason was given but it was indicated that management would not change.

Wild Bird Seed Mix

Four farms reported dropping Wild Bird Seed Mix (EF2). One ETIP farm had replaced it with a field corner option (EK1). Of three non-ETIP farms, one did not have any WBSM, one had removed one patch to create an orchard, but maintained other areas, and the third retained theirs but took them out of the scheme so they could include maize in the mixture at the request of the shooting syndicate.

Flower Nectar Mix

One non-ETIP farm dropped their pollen and nectar mix from their ELS agreement but was planning to continue with the same management.

Skylark Plots

Two ETIP farms dropped the skylark plot option (EF8). On one farm they still exist but are now done on a voluntary basis under CFE. The other farmer has stopped doing them because he felt that they had no beneficial effect on the skylarks.

Grasslands

Two non-ETIP farms dropped the option for archaeology on grassland (ED5/OD5); no reason was given but it was indicated that management would not change.

Five farms dropped the low input grassland option (E/OK2, EL2). In two cases (non-ETIP) the farmers choose to put land into the very low input grassland option instead. One farmer was letting out the grazing and so didn't want any restrictions on it; another had removed the land from his agreement so it could go into that of his tenant. The other two farmers wanted more flexibility in managing their fields, such as being able to put on more farm yard manure when growing for silage.

Four farms (one ETIP, three non-ETIPs) dropped the very low input grassland option (EK3/OK3) or reduced the area within it. On one ETIP farm this was because of a thistle problem. At another, some land previously in OK3 was no longer under the farmer's management, and the remainder was changed to OK2. Another farm had dropped OK3 but had put some of the area into OK1.

Three farms (1 ETIP, 2 non-ETIPs) dropped the mixed-stocking option (E/OK5). In one case this was because the farmer no longer had any cattle available, another because he found it difficult to manage and overly bureaucratic.

Impact of dropping options on subsequent management

Where farmers reported dropping an option, they were asked whether they had changed the way these parcels or features were managed. The response was as follows:

Table 68. Impact of dropping options on subsequent management.

Number of options where management has changed

	Yes	No	Total	% Yes
ETIP	15	7	22	68%
No ETIP	11	23	34	32%
ETIP unknown	14	3	17	82%
All	40	33	73	55%

The difference here between ETIP and non-ETIP farms is statistically significant at 5% (chi square test), suggesting that management was more likely to change on a feature which had been dropped from an ETIP farm than on one that was dropped on a non-ETIP farm. An even higher proportion of dropped options led to a change in management on the farms where ETIP was unknown.

Closer examination of the data reveals that there are two processes involved. In some cases parcels of land or linear features are taken out of ELS; in some of these the management changes, whilst in others it remains as it was when in an ELS option. In other situations, parcels of land or linear features are dropped from one option but put into another; this may involve an increase in value, for instance from low input grassland (EK2) to very low input grassland (EK3), or a loss of value, e.g. from enhanced hedgerow management (EB3) to hedgerow management for landscape (EB1 or EB2).

Table 69. Reasons for dropping ELS options and the impact on subsequent management.

	change to another option				removal from ELS				
	< value	%	>value	%	same mgmt	%	changed mgmt	%	Total
ETIP	2	5%	1	3%	5	14%	29	78%	37
Non ETIP	4	10%	5	12%	20	49%	12	29%	42
ETIP unknown	1	7%	0	0%	0	0%	13	93%	14
Total	7	8%	6	7%	25	27%	54	59%	92

85% of the options dropped represented parcels or features being taken out of ELS (91% on ETIP farms, 78% on non-ETIP farms). Within this group, management changed in 62% of cases (85% on ETIP farms, 38% on non-ETIP farms). Where management changed, this usually meant a loss of value, such as field corners or buffers being ploughed up or hedges returning to an annual cut.

15% of the options dropped were situations where the parcels or features remained in ELS under a different option (8% on ETIP farms, 22% on non-ETIP farms). About half of these changes represent an increase in value, half a decrease. There is a statistically significant difference between the outcomes on ETIP and non-ETIP farms (5% level chi square test) with a higher proportion of the dropped options on ETIP farms being removed from the scheme entirely rather than changed to another option.

4.3.2 New options adopted at renewal of ELS agreements

4.3.2.1 The number of farmers taking up new options at renewal of their agreements

Some options, such as the soil and nutrient management plans, were discontinued in 2010 and so farmers who had taken up these options in their first agreement, or who wanted to drop other options, needed to find replacement points either by extending the areas under other existing options or by adding new options.

Of the farmers interviewed, 65% had taken up at least one new option when renewing their ELS agreement. The ETIP farms and ETIP unknown group were slightly above average in taking up new options, the non-ETIP group slightly below average (Table 70).

Table 70. Number of farms that took up new options on renewal.

	ETIP		NON-ETIP		ETIP unknown		All Farms	
Farms with at least one new option	40	67%	33	61%	19	68%	92	65%
Farms with no new options	20	33%	21	39%	9	32%	50	35%
Total	**60**		**54**		**28**		**142**	

4.3.2.2 Options taken up for the first time on renewal of ELS agreements

Table 14 shows the 195 options new to the second agreement which were recorded on the farms visited. Of these, 43% were on ETIP farms, 33% were on non-ETIP farms, and 24% on farms of unknown status. This suggests that farmers who had received ETIP advice were a little more likely to take up at least one new option, however the difference between the ETIP and non-ETIP farms is not statistically significant.

A number of additional options were made available to farmers in 2010; those which featured in the survey are in bold type.

Earth bank management (1 or both sides) O/EB12/13
Establishment of hedgerow trees by tagging O/EC23
Hedgerow tree buffer strips on cultivated land O/EC24
Hedgerow tree buffer strips on grassland O/EC25
Maintenance of weatherproof traditional farm buildings O/ED1
6m buffer strips on cultivated land next to a watercourse O/EE9
6m buffer strips on grassland next to a watercourse O/EE10
Un-cropped cultivated areas for rare plants OF11
Extended overwintered stubbles EF22
12m buffer strips for watercourses on cultivated land O/EJ9
Enhanced management of maize crops to reduce soil erosion and run-off EJ10
Maintenance of watercourse fencing O/EJ11
Winter cover crops O/EJ13

Of these additional options, the one for Maintenance of weatherproof traditional farm buildings (ED1) was by far the most frequently taken up in the sample surveyed, accounting for 16% of the new options added at renewal.

Of the existing options, many farmers took up grassland options, mostly low input (EK2) & very low input grassland (EK3); these were fairly evenly spread between ETIP and non-ETIP farms. Stubbles, field corners, wild bird seed and nectar flower mixes were also added quite frequently and more often on ETIP farms.

Of the options taken up for the first time on renewal, 76% were priority options. There was little difference in this proportion across the three groups (ETIP 77%, non-ETIP 75%, ETIP unknown 77%, Table 71).

Table 71. New options adopted at renewal (priority options in bold).

Feature	Option	ETIP	No ETIP	ETIP unknown	Total	%
Hedges	E/OB1&2,E/OB4	2	5	2	9	5%
Ditches	**E/OB6,7**		**1**	**3**	**4**	**2%**
Hedge/Ditches	E/OB8,9,10		2		2	1%
Enhanced hedges	**E/OB3**	**1**	**4**	**2**	**7**	**4%**
Walls	E/OB11			1	1	1%
Earth banks	EB12,13	4	4	2	10	5%
In-field Trees	E/OC1&2	3			3	2%
Wood fence/edge	**E/OC3&4**	**4**			**4**	**2%**
Hedge tree tags	**EC23**		**1**		**1**	**1%**
Farm buildings	**E/OD1**	**14**	**10**	**8**	**32**	**16%**
Archaeology	**ED2,3,4,5**	**2**		**1**	**3**	**2%**
Buffers arable	E/OE1,2&3	6	1	3	10	5%
Buffers grass	E/OE4,5,6	2	1	0	3	2%
Buffers by ponds	**EE7,8**		**1**	**1**	**2**	**1%**
Buffers by watercourses	**EE9,10**	**3**	**2**		**5**	**3%**
Stubble/cereals	**E/OF6,22,E/OG1,4**	**7**	**3**	**3**	**13**	**7%**
Field corners	**E/OF1,E/OK1**	**8**	**4**	**4**	**16**	**8%**
Un-cropped cult areas	**EF13**	**1**		**1**	**2**	**1%**
Reduced herbicide crops	**EF15**	**1**	**2**	**1**	**4**	**2%**
WBSM/P&N	**E/OF2&4**	**9**	**3**	**2**	**14**	**7%**
Skylark plots	**E/OF8**	**1**	**2**		**3**	**2%**
Soil/water protection	**EJ2,9,10,11**	**5**	**1**		**6**	**4%**
Grassland non-SDA	**E/OK2,3,4**	**10**	**14**	**9**	**33**	**17%**
Grass SDA & mix stock	E/OK5,E/OL2,6	1	3	3	7	4%
Total Priority options		**65**	**48**	**36**	**149**	**76%**
Total Non-priority options		19	16	11	46	24%
Total		84	64	47	195	

4.3.2.3 Changes in management of features in new options

Farmers taking up new options were asked whether the management of those features had changed as a result of entering the scheme, or whether they had previously been managed in the same way (Table 15).

Table 72. Did you undertake this management before entering ELS?

CATEGORY	Non-ETIP		ETIP		ETIP unknown		Total		
	Yes	No	Yes	No	Yes	No	Yes	No	%Yes
Boundaries	17	8	12	7	23	5	52	20	72%
Trees & woodland	3	1	6	2	6	2	15	5	75%
Historic & landscape	10		15	1	10	2	35	3	92%
Buffers		4	8	6	5	5	13	15	46%
Arable land	1	14	6	22	7	12	14	48	23%
Soil & water		1	2	3		1	2	5	29%
Grassland	14	5	5	9	19	9	38	23	62%
TOTAL	**45**	**33**	**54**	**50**	**70**	**36**	**169**	**119**	**59%**

Over all option categories, management had changed in 59% of cases (52% on ETIP farms and 58% on non-ETIP farms). Continuity was greatest in the historic & landscape category (mostly farm buildings) where management continued as previously in 92% of options. The greatest proportion of management changes occurred in the options on arable land and buffers.

Where management had changed as a result of entering the scheme, farmers were asked how it had changed; information was provided for 74 options. In the cases of hedges, some which had been cut annually were now on a longer rotation as a result of being entered into the scheme but others which had been unmanaged, had been brought back into management. Some hedges, banks and ditches had been fenced to exclude stock. One farmer commented that he left a larger area undisturbed around his in-field trees.

After entering farm buildings into ELS, farmers reported spending more on maintaining them and carrying out repairs more quickly. Two farmers who had entered grass fields with archaeology had excluded cattle and ring feeders.

Two farmers reported that they were maintaining their over-winter stubbles later into the spring to comply with ELS. Grasslands were generally receiving less fertiliser as a result of being entered into the scheme and were less frequently harrowed; some farmers had reduced stocking rates to maintain required sward heights. Rush management had changed on two farms with a third of the rush area being topped when it was dry enough where previously the whole area would have been cut. One of the mixed stocking areas was receiving less fertiliser and supported fewer stock.

4.3.3 Options renewed

4.3.3.1 Have you changed the way renewed options are managed in the new agreement? If so, what has changed?

For those options carried forward from a previous agreement, farmers were asked if the management had changed for the new agreement. Management of features under agreement had changed on 22% of farms, but for less than 10% of options. The proportion of management changed was similar, but slightly lower where ETIP advice had been received (Table 73).

Table 73. Number of options and farms where management had changed for a new agreement.

	Number of options			Number of farms		
	Changed management	**n**	**% changed**	**Changed management**	**n**	**% changed**
ETIP	22	324	6.8	13	59	22.0
No ETIP	21	219	9.6	13	50	26.0
ETIP unknown	8	130	6.2	4	27	14.8
Total	51	673	7.6	30	136	22.1

Management was most likely to have changed in the new agreement for: hedges, arable buffers, buffering ponds, wild bird seed mix/pollen and nectar mixes and grasslands (Table 74). The proportion of farms that changed the management on SDA grassland was high, but was based on only a small number of farms. The proportion of features where management changed was generally similar for ETIP and Non-ETIP farms and differences between these two groups only occurred where sample sizes were small.

Only a small number of comments were made regarding specific changes in management. Changes made to hedge management included maintenance of taller hedges and cutting less frequently and later in the year. Buffer strips often required management to control weeds. A number of grassland features were receiving lower fertiliser inputs in the new agreement.

Table 74. Number of options where management had changed (Y) for a new agreement.

Feature	Option	NON ETIP			ETIP			ETIP unknown			Total		
		n	Y	%	n	Y	%	n	Y	%	n	Y	%
Hedges	E/OB1,2,4,5	56	4	*7*	80	8	*10*	32	4	*13*	168	16	*10*
Ditches	**E/OB6,7**	**17**	**0**	***0***	**29**	**0**	***0***	**5**	**0**	***0***	**51**	**0**	***0***
Hedge/Ditch	E/OB8,9	22	1	*5*	28	0	*0*	12	0	*0*	62	1	*2*
Enhanced hedge	**E/OB3,10**	**12**	**2**	***17***	**19**	**1**	***5***	**10**	**2**	***20***	**41**	**5**	***12***
Walls	E/OB11	7	0	*0*	8	0	*0*	2	0	*0*	17	0	*0*
In-field Trees	E/OC1&2	18	1	*6*	29	2	*7*	8	1	*13*	55	4	*7*
Wood fence/edge	**E/OC3,4**	**5**	**0**	***0***	**6**	**0**	***0***	**4**	**0**	***0***	**15**	**0**	***0***
Farm buildings	**E/OD1**	**2**	**0**	***0***	**0**	**0**		**0**	**0**		**2**	**0**	***0***
Archaeology	**E/OD2,3,4,5**	**5**	**0**	***0***	**6**	**0**	***0***	**1**	**0**	***0***	**12**	**0**	***0***
Buffers arable	E/OE1,2,3	15	3	*20*	26	2	*8*	11	1	*9*	52	6	*12*
Buffers grass	E/OE4,5,6	1	0	*0*	8	0	*0*	4	0	*0*	13	0	*0*
Buffers by ponds	**EE7,8**	**3**	**0**	***0***	**4**	**1**	***25***	**2**	**0**	***0***	**9**	**1**	***11***
Stubble/cereals	**E/OF6, E/OG1,4**	**5**	**1**	***20***	**11**	**0**	***0***	**5**	**0**	***0***	**21**	**1**	***5***
Field corners	**E/OF1, E/OK1**	**8**	**2**	***25***	**12**	**0**	***0***	**8**	**0**		**28**	**2**	***7***
WBSM/P&N	**E/OF2,4**	**6**	**1**	***17***	**13**	**2**	***15***	**2**	**0**	***0***	**21**	**3**	***14***
Arable options	**E/OF7,8,11**	**1**	**0**	***0***	**4**	**1**	***25***	**3**	**0**	***0***	**8**	**1**	***13***
Soil/water protection	**EJ2**	**0**	**0**		**1**	**0**	***0***	**0**	**0**		**1**	**0**	***0.0***
Grassland non-SDA	**E/OK2,3,4**	**26**	**3**	***12***	**33**	**4**	***12***	**13**	**0**	***0***	**72**	**7**	***10***
Grassland/mixed SDA	E/OL2,3,4, E/OK5	10	3	*30*	7	1	*14*	8	0	*0*	25	4	*16*
Total Priority options		**90**	**9**	***10***	**138**	**9**	***7***	**53**	**2**	***4***	**281**	**20**	***7***
Total Non-priority options		129	12	*9*	186	13	*7*	77	6	*8*	392	31	*8*
Total all		**219**	**21**	***10***	**324**	**22**	***7***	**130**	**8**	***6***	**673**	**51**	***8***

4.3.4 Management within and outside ELS

4.3.4.1 If you had not chosen this option, would you still have carried out this management?

Some farmers stressed this was a difficult question to answer since it was affected by a range of factors some of which were unpredictable such as the price they could get for grain or livestock and the cost of inputs, however the responses gathered for 531 options are presented in Table 75.

Over all the options, farmers indicated that for 61% of options they would still have carried out the same management; 60% on ETIP farms, 68% on non-ETIP farms and 58% on farms with unknown ETIP status. However the proportions vary from option to option, being much lower for buffers (48%) and options on arable land (37%) and highest for resource protection options (88%) and historic/landscape options (83%).

Table 75. Number of options with Yes or No responses to the question: 'If you had not chosen this option, would you still have carried out this management?'

CATEGORY	NON ETIP		ETIP		ETIP unknown		TOTAL		
	Yes	No	Yes	No	Yes	No	Yes	No	%Yes
Boundaries	66	25	110	61	40	43	216	129	63%
Trees & woodland	16	4	30	9	16	2	62	15	81%
Historic & landscape	11	1	20	5	13	3	44	9	83%
Buffers	6	16	29	28	17	13	52	57	48%
Arable land	13	15	24	41	11	27	48	83	37%
Soil & water	1		4	1	2		7	1	88%
Grasslands	33	10	32	19	37	10	102	39	72%
TOTAL	**146**	**71**	**249**	**164**	**136**	**98**	**531**	**333**	**61%**

There is a statistically significant difference between the responses to this question from ETIP and non-ETIP farms, both for all options considered together and for the boundary and grassland categories (chi square test at 5%); in both cases non-ETIP farms were more likely to have carried out the same management if they had not chosen to put the feature into ELS. Buffers are the only category for which ETIP farmers were more likely than non-ETIP farmers to have carried out the same management.

4.3.4.2 Do you have similar features which are not managed under ELS?

For each option, farmers were asked whether they had other similar linear features or parcels of land which had not been entered into the scheme (Table 76).

Table 76. Number of options with Yes or No response to the question: 'Do you have similar features that are not managed under ES?

CATEGORY	NON ETIP		ETIP		ETIP unknown		TOTAL	
	Yes	%	Yes	%	Yes	%	Yes	%
Boundaries	27	34%	53	32%	23	29%	103	32%
Trees & woodland	5	25%	11	28%	6	33%	22	29%
Historic & landscape		0%	6	25%	4	29%	10	21%
Buffers	1	5%	18	32%	6	20%	25	23%
Arable land	4	15%	13	20%	8	23%	25	20%
Soil & water		0%	1	20%	1	50%	2	25%
Grasslands	4	13%	13	25%	15	34%	32	26%
TOTAL	**41**	**22%**	**115**	**28%**	**63**	**29%**	**219**	**27%**

The buffers were the only category which showed a significant difference (at 5% using chi square test) between ETIP and non-ETIP farms.

For 73% of options, when farmers chose a particular option, they put all the land or features eligible for that option into the scheme. For 27% of options, they only entered some of their eligible land or features. On ETIP farms, 72% of options included all eligible land or features; on non-ETIP farms it was 78%, on farms of unknown ETIP status it was 71%.

4.3.4.3 For those options, where not all features are in ES, roughly what percentage is in ES?

When not all of a feature was entered into ELS, then the percentage entered averaged at 66%, over all options. This was marginally higher on non-ETIP farms at 70% compared to 64% on ETIP farms and 51% on farms of unknown ETIP, (Table 77).

Table 77. Percentage of features entered into ELS, where not all of a feature was entered.

CATEGORY	NON ETIP		ETIP		ETIP unknown		TOTAL	
	No.	%	No.	%	No.	%	No.	%
Boundaries	25	72%	53	65%	23	66%	101	67%
Trees & woodland	5	53%	11	48%	6	65%	16	50%
Historic & landscape			4	71%	4	53%	4	71%
Buffers	1	95%	18	73%	6	43%	19	74%
Arable land	4	66%	13	69%	7	57%	17	70%
Soil & water			1	70%	1	15%	1	70%
Grassland	4	66%	13	54%	15	60%	17	57%
TOTAL	**39**	**70%**	**113**	**64%**	**62**	**51%**	**152**	**66%**

4.3.4.4 Are the features not in ELS, managed differently? How does management differ? Are they under your management control?

Sample sizes for management outside ELS, that benefits soil and water management and the historic environment, were very low. For features with larger sample sizes, grassland was most likely to be managed differently, and trees and woodland were least likely to be different under ES (Table 78).

Table 78. Number of options with Yes or No responses to the question: 'Are the features not in ES managed differently?'

CATEGORY	NON ETIP		ETIP		ETIP unknown		TOTAL	
	Yes	%	Yes	%	Yes	%	Yes	%
Boundaries	14	58%	20	37%	15	63%	49	48%
Trees & woodland			2	17%			2	11%
Historic & landscape								
Buffers			11	65%			11	46%
Arable land	1	33%	8	53%	2	40%	11	48%
Soil & water			1	100%			1	50%
Grassland	1	25%	10	83%	7	54%	18	62%
TOTAL	**16**	**44**	**52**	**46%**	**24**	**42%**	**92**	**44%**

The grassland category was the only one which showed a significant difference (at 5% using chi square test) between ETIP and non-ETIP farms.

Boundaries

Where farmers indicated that hedges not in the scheme were managed differently, this was mostly because they were cut annually (N=27). For hedge/ditch combinations it was mostly because the ditch was managed by the local drainage board (N=4) or because they were cut or cleaned more frequently than allowed under ELS (N=3).

Similarly, where farmers indicated that ditches (without hedges) not in the scheme were managed differently it was because they were managed by the local drainage board (N=6) or were cleaned out more frequently than allowed under ELS (N=1).

Only two farms commented on walls which they had excluded from the scheme. The reasons given were that the excluded walls were not maintained as well (N=1) or were being allowed to fall down (N=1).

Trees

Some in-field trees were excluded from the scheme because they were less mature (N=1) or because the farmer wanted to remove the fallen branches (N=1).

Buffer strips

Some buffer strips were excluded from ELS because they were still in Countryside Stewardship agreements (N=4), were cut more frequently (N=3) or were used for vehicle access (N=1).

Options on arable land

EF1 Field corners: reasons given for excluding some of these from ELS were that they were in Countryside Stewardship or CFE (N=1), that they were left unmanaged (N=2), or that they were cut more often (N=2).

EF2 Wild bird seed mix: differences in management reflected different species being sown such as maize or only one or two species instead of the three specified in ELS (N=5).

EF4 Nectar flower mix: the difference in management was to do with the cutting regime (N=2).

EF6 Over-winter stubbles: those not in the scheme were ploughed at the end of January (N=1).

Grasslands

EK2 Low input grasslands: fields not in the scheme received more fertiliser (N=6) or herbicides (N=1), and/or were rolled or harrowed (N=2).

EK3 Very low input grasslands: fields not in the scheme received more fertiliser (N=6) or herbicides (N=1), and/or were rolled or harrowed (N=2).

EK5 Mixed stocking: fields not in the scheme received more inputs (N=1), supplementary feeding (N=1), or were in an arable rotation (N=1).

Management control

Farmers reported that 94% of the options not in ELS were under their control (Table 22). The management of some boundaries were not under the farmer's control; this included ditches managed by the drainage board and hedges next to roads or neighbours. In some cases woodlands were managed by an estate or shooting interest rather than the farm. Some grassland was let out to graziers and so the farmer had only limited control over stocking density and applications of fertiliser and herbicides.

Table 79. Number of options with Yes or No response to the question: 'Are the features not in ELS under your management control?'

CATEGORY	NON ETIP		ETIP		ETIP unknown		TOTAL	
	Yes	%	Yes	%	Yes	%	Yes	%
Boundaries	15	100%	18	78%	15	100%	48	91%
Trees & woodland	2	50%	9	100%	3	100%	14	88%
Historic & landscape			2	100%	1	100%	3	100%
Buffers			9	100%	5	100%	14	100%
Arable land	1	100%	10	100%	2	100%	13	100%
Soil & water			1	100%	1	100%	2	100%
Grassland	4	100%	10	91%	8	100%	22	96%
TOTAL	**22**	**92%**	**59**	**91%**	**35**	100%	**116**	**94%**

The boundaries and trees & woodland are the only categories which show a significant difference (at 5% using chi square test) between ETIP and non-ETIP farms.

4.3.5 Benefits arising from options

4.3.5.1 What benefits do you think this option achieved?

Farmers were asked what benefits they thought each option achieved for plants, birds, other wildlife, resource protection, the historic environment and climate change. Considering all options together, farmers thought that 34% of options gave lots of benefit, and a further 30% some benefit, 34% were felt to have no benefit, whilst less than 1% were thought to have a negative effect (Table 80).

Table 80. Benefits considered by farmers to arise from ELS options.

		What benefits do you think this option achieved for:						
	Sample size	Plants	Birds	Other wildlife	Resource protection	Historic environ-ment	Climate change	Overall
No response	118	1%	1%	2%	3%	1%	5%	2%
Lots of benefit	1771	36%	56%	51%	22%	32%	5%	34%
Some benefit	1581	35%	31%	34%	31%	21%	30%	30%
No benefit	1751	27%	11%	13%	43%	45%	60%	34%
Negative	17	1%	0%	0%	1%	0%	0%	0%
Total	**5238**							

Birds and other wildlife were thought to gain lots of benefit from more than half of the ELS options, the historic environment from a third, and resource protection from a fifth. Farmers were generally less clear about the benefits to climate change; 30% thought there would be some benefit, 60% thought it would have no effect, and only 5% thought there would be a lot of benefit.

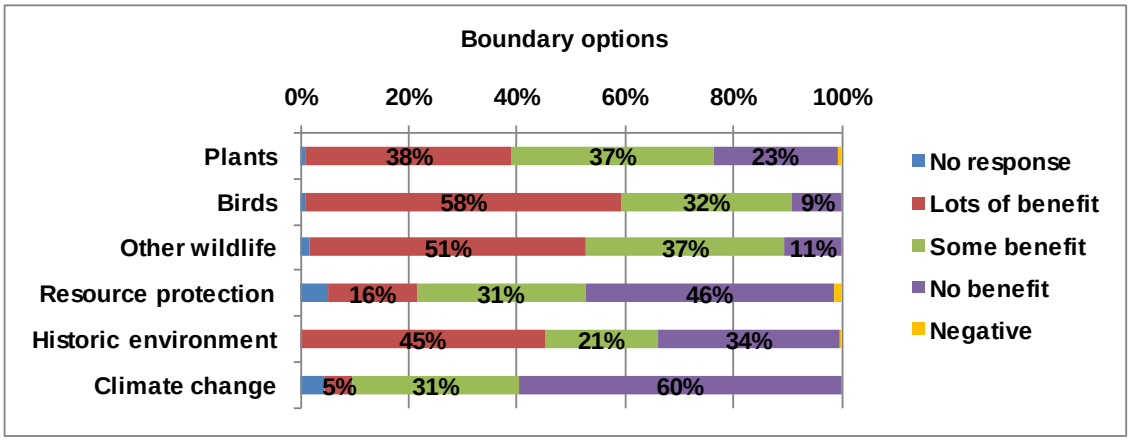
Consideration of these figures in terms of ETIP and non-ETIP farms, as shown in Table 81 indicates that overall the attitudes of the two groups are very similar.

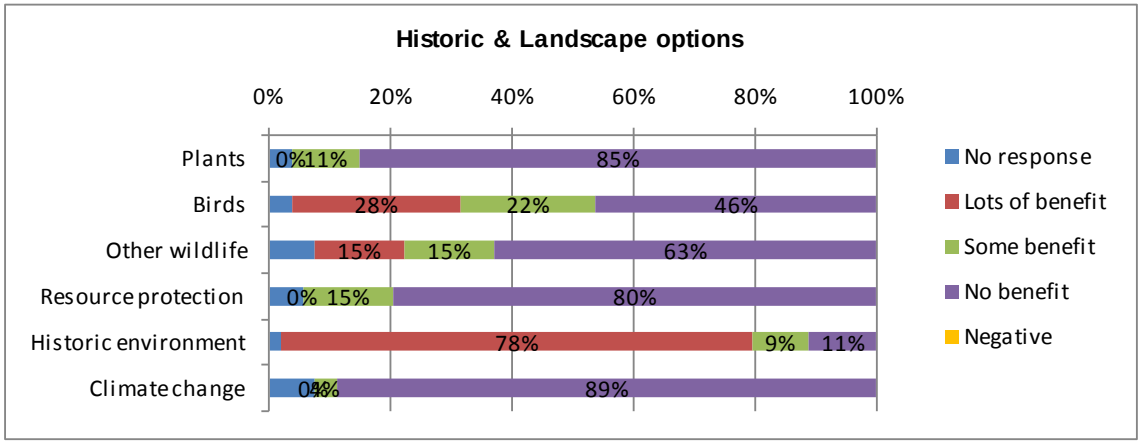
Table 81. Benefits thought by farmers to arise from ELS options: comparison of ETIP and non-ETIP over all options.

RESPONSE	Number of options		% of options	
	NON-ETIP	ETIP	NON-ETIP	ETIP
No response	28	48	2%	2%
Lots of benefit	475	827	35%	33%
Some benefit	396	747	29%	30%
No benefit	438	856	33%	34%
Negative	7	6	1%	0%
Total	**1344**	**2484**		

There is no statistical difference between the ETIP and non-ETIP responses at the 5% level (chi square test).

More detailed consideration of responses for each option or option group provides more information on the relative benefits which farmers ascribe to different options, although there is some conflation of the benefits from the feature itself and those from the option prescription.





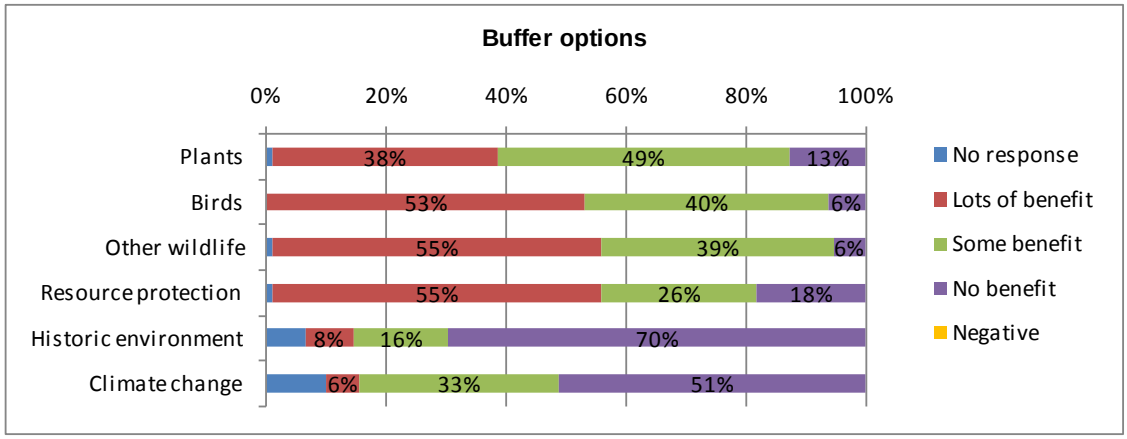


Figure 25. Benefits thought by farmers to arise from ELS options for different option categories (a) boundary; (b) historic and landscape options and (c) buffer options.

Figure 26. Benefits thought by farmers to arise from ELS options for different option categories: (d) arable options; (e) tree & woodland options; (f) grassland options and (g) resource protection options.

4.3.6 Effects on the farm business

4.3.6.1 What effects do you think this option will have on your business?

Farmers were asked whether they thought that each option would have a positive, negative or negligible effect on their farm business (Table 82).

Table 82. Perceived effects of ELS options on farm businesses.

CATEGORY	Sample Size	Positive	No effect	Negative
Boundaries	355	11%	82%	7%
Trees & woodland	77	8%	81%	12%
Historic & landscape	55	16%	69%	15%
Buffers	109	20%	56%	24%
Arable land	134	19%	58%	23%
Soil & water	8	0%	75%	25%
Grasslands	141	16%	72%	12%
TOTAL	**879**	**14%**	**72%**	**14%**

Over all the options, farmers felt that their businesses would be unaffected by 72% of options, while 14% had a positive effect and 14% a negative one. Options on arable land and buffers were perceived to have the highest proportion of both positive and negative effects on farm businesses.

Taking all the options together there was little difference between the attitudes of farmers on ETIP and non-ETIP farms: farmers on ETIP farms think there will be no effect on 76% of options compared with 71% on non-ETIP farms. ETIP farmers thought 19% of options would have a negative effect compared with 14% on non-ETIP farms, and that 10% would have positive effects compared to 11% on non-ETIP farms (Table 83).

Table 83. Perceived effects of ELS options on farm business: comparison of ETIP and non-ETIP farms.

	Sample size	Positive	No effect	Negative
ETIP	422	10%	76%	14%
NON ETIP	221	11%	71%	19%

Considering each option group, there was a statistically significant difference in responses between the ETIP and non-ETIP farmers only for the Boundaries and Historic & Landscape option groups. As illustrated in Figure 27 the ETIP farmers thought a greater proportion of options were having no effect on their businesses, whilst the non-ETIP farmers thought more were having a negative effect.

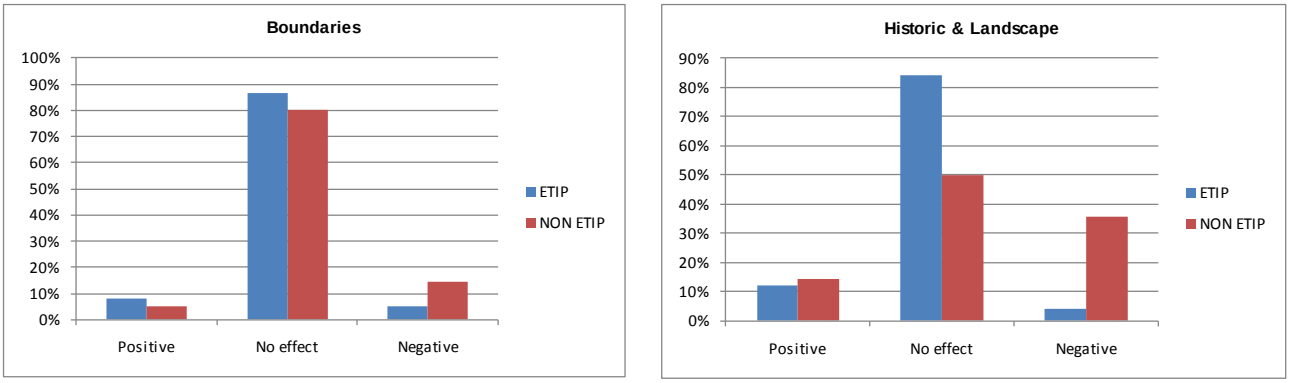


Figure 27. Perceived effects of ELS options on farm business: comparison of ETIP and non-ETIP farms for Boundaries and Historic & Landscape option groups.

Sixty-five farmers commented on the effects of individual options on farm businesses; comments were received on 99 options on this topic. In general, farmers felt that most options did not incur costs beyond those that they would have had anyway, or where they did, the ELS payment was sufficient to compensate them.

Some farmers felt that the longer hedge rotations led to greater costs in labour, fuel and repairs to machinery from cutting hedges, while others felt it balanced out as the hedges were not cut every year; a few farmers felt their livestock benefitted from the greater shelter provided by taller thicker hedges. Some farmers bemoaned the loss of arable land and grass as it wasn't possible to cut so close to larger hedges and the cattle didn't graze under them.

Some farmers considered buffers to represent foregone income from crops or grass but others said they would have had them anyway to protect watercourses or hedges. One farmer felt they made a positive contribution by reducing pests and diseases and stopping weeds getting into the crops and hay.

Some farmers commented on the weed problems associated with arable options; one mentioned that overwinter stubbles meant he had to work the land more because it was not broken up by frosts, thus increasing energy costs.

Several farmers mentioned that the restrictions on fertiliser and herbicides on low input grasslands reduced the availability of grass, especially in drought years, and reduced their flexibility because they could not use supplementary feeds, so stock had to be excluded from fields in these options to prevent overgrazing. However several farmers mentioned that they would have reduced fertiliser use regardless of ELS due to the rise in prices.

4.3.7 Ease of management

4.3.7.1 Was the management prescription easy to follow? If no, why not?

Farmers reported that they found the management prescriptions easy to follow for 96% of options. The few difficulties encountered were mostly with buffers, options on arable land, and boundaries (Table 84).

Table 84. Number of options with Yes or No response to the question: 'Was the management prescription easy to follow?'

CATEGORY	Non-ETIP		ETIP		ETIP unknown		ALL		
	No	Yes	No	Yes	No	Yes	No	Yes	% Yes
Boundaries	3	92	11	164	3	81	17	337	95%
Trees & woodland		19		40		18	0	77	100%
Historic & landscape		14	1	24		16	1	54	98%
Buffers		21	6	51		30	6	102	94%
Arable land		30	4	63	2	36	6	129	96%
Soil & water		1		5		3	0	9	100%
Grasslands	2	42	1	51	1	47	4	140	97%
TOTAL	**5**	**219**	**23**	**398**	**6**	**231**	**34**	**848**	**96%**

One farmer reported that the rules were too complicated, another that they are insufficiently flexible, two that the prescriptions were too wordy, one on a lack of clarity, another that they were easy to understand but not easy to carry out. Other comments dealt with particular problems with specific options, such as establishment and weed control.

4.3.7.2 Do you anticipate any problems in the management of this option?

Farmers were asked for each option in their renewed agreement whether they anticipated any management problems. A summary of the response is given in Table 85. Overall, for all options, farmers were concerned about the management of only 10% of options. This was slightly higher on ETIP farms where problems were anticipated on 11% of options compared to 7% of responses on non-ETIP farms. This suggests that the overall level of concern about future management problems was low and that the level of concern had not been much affected by the ETIP process.

Table 85. Number of options with Yes or No response to the question: 'Do you anticipate any problems in the management of this option?'

CATEGORY	NON ETIP		ETIP		ETIP unknown		ALL FARMS	
	Yes	% Yes	Yes	% Yes	Yes	% Yes	Yes	% Yes
Boundaries	5	4%	17	9%	8	8%	30	7%
Trees & woodland	3	12%	1	2%	1	5%	5	6%
Historic & landscape	0	0%	2	8%	1	6%	3	5%
Buffers	6	25%	12	21%	5	15%	23	20%
Arable land	4	12%	10	15%	6	15%	20	14%
Soil & water	0	0%	0	0%	0	0%	0	0%
Grasslands	3	5%	4	8%	6	12%	13	8%
TOTAL	**21**	**7%**	**46**	**11%**	**27**	**10%**	**94**	**10%**

The only statistically significant difference between ETIP and non-ETIP farms was for the boundaries (5% level for chi square test).

Most concern was expressed with regard to the buffer strips: 21% of responses about buffers on ETIP farms, 25% on non-ETIP farms, 15% ETIP unknown. Eight farmers reported that creation of the strips had led to problems with unauthorised access; in most cases this was walkers, but two farmers specified a problem with dogs, four specified poachers, two specified unauthorised vehicles and one farmer had a problem with fly-tipping. In addition, four farmers were concerned about problem weeds such as thistles, docks and nettles spreading from buffer strips into crops. Another farmer was concerned about the spread of woody suckers from the hedge into the buffer, another about damage caused to a strip by badgers and a third about damage caused by cleaning out an adjacent watercourse.

Options on arable land also caused concern: 15% of responses about options on arable land on ETIP farms and ETIP unknown, and 12% of those on non-ETIP farms anticipated management problems. More specific information was provided for 20 options which indicated that most difficulty was expected with weed problems, but also spread of woody growth, difficulty in establishment, unauthorised access/dumping and birds/nests being destroyed by predators and inadvertently by machinery.

Boundary options were a source of concern on some farms: 9% of the responses relating to boundaries on ETIP farms anticipated some difficulty in management, 8% on farms of unknown status and 4% on non-ETIP farms. Specific comments were provided for 28 options. Most concerns related to hedge management: many farmers considered that leaving hedge trimming for 2 or 3 years caused damage to machinery and/or to hedge structure, causing a more open hedge; this was particularly the case where hedges included a lot of elm or ash and were fast growing. Several farmers were unhappy about the rules on timing, wanting to trim hedges earlier in the year, especially adjacent to arable fields and on wet ground. There was some concern also about the effects of drought on hedges, especially on new planting to fill gaps. Two farmers expressed concerns about ditch management both relating to rules on timing for cutting and cleaning out ditches. One farmer was concerned about the cost of maintaining dry stone walls because the original stone was badly weathered and new stone had to be bought in to make repairs.

On ETIP farms, 2% of responses relating to options for trees & woodlands anticipated problems, whilst the figure was 12% for non-ETIP farms. Specific comments were provided for 8 options. Concerns for in-field trees were about what would happen if the entered trees died or became dangerous, since many in-field trees are quite old. One farmer with the option for managing woodland edge was concerned about keeping poachers out, another about weed control.

Only 2 farmers expressed specific concerns about the management of historic and landscape options and both these related to the cost of maintaining traditional farm buildings.

Only a small proportion of the grassland options outside SDAs were causing concern: 8% of responses for ETIP farms and 6% for non-ETIP farms. No one reported concerns regarding the grassland and moorland options on non-SDA land. Specific comments were provided for 13 options. Concerns with low input (EK2) and very low input grasslands (EK3) were mostly related to weed control (ragwort, gorse and thistles) and to maintaining the sward height within the prescribed range. Two farmers expressed concerns with the mixed stocking option

(EK5): one had decided to keep more cattle to ensure the correct balance, the other had difficulties caused by a recent drought reducing the amount of grass available.

None of the responses for soil and water protection options anticipated any management problems.

4.3.8 Option location

4.3.8.1 How did you decide where to place this option?

For each option, farmers were asked how they decided which land or features to include in the scheme.

Boundaries

Farmers provided responses to this question for 328 boundary options.

Most farmers who entered their hedges into the scheme, put in all of them other than those which they felt needed an annual cut because they are next to roads or tracks, or in some cases, boundaries with neighbours.

On a few farms, farmers had been more selective, only entering the hedges which were in good condition, or those where it was felt a longer rotation would not cause a problem, i.e. the slow growing hedges, avoiding those with a lot of elder and ash.

One farmer only put in hedges which were not adjacent to ditches, because on a longer rotation the hedge clippings became a problem by blocking the ditches.

Most farmers who put ditches in the scheme, put in all those under their control, but others only put in those which did not generally get cleaned out. One farmer specifically excluded ditches where a faster flow of water was needed, so that he could clean them out more often. Some farmers excluded ditches which were usually dry for part of the year; another only included ditches in his low-input pastures.

Some farmers entered all their walls, or all those which were in a good enough condition; others were more selective and only included the walls which they needed to maintain as stock-proof barriers.

Trees & Woodland

Farmers provided responses to this question for 75 tree and woodland options.

Most farmers who put in-field trees into their agreements entered all those which were eligible, but some only entered the larger trees. Some put in trees in grass fields but excluded the ones in arable fields, so there wouldn't be a problem if the ground was ploughed too close. A few were more selective, only entering in-field trees which were not likely to get in the way of machinery.

EC23 Tagging trees in hedges had been entered for a hedge which was out of the way of machinery and power cables.

EC25 Buffers next to hedgerow trees were entered on one farm, but only for permanent pastures.

Historic & Landscape

Farmers provided responses to this question for 55 historic and landscape options.

ED1: most farmers who entered farm buildings into their agreements put in all those which were eligible. Some were left out because there were plans for change of use.

ED5: archaeological features on grassland – most farmers entered all the fields they had which were eligible; one chose only the less productive land.

Buffers

Farmers provided responses to this question for 106 buffer options.

Some farms put in buffer strips which had been established under previous Countryside Stewardship schemes. In a few cases buffers had been put around all fields, but usually farmers chose those next to woodland or watercourses, ponds or springs. Some were put along unproductive field edges or areas where it was difficult to get machinery; sometimes they were used to give a straight edge to a cultivated area where the field boundary was irregular. Some farmers had put thought into positioning buffers where they thought they would be most beneficial for wildlife or in preventing soil erosion.

Options on arable land

Farmers provided responses to this question for 129 options on arable land.

EF1 Field corners on arable land were often put on unproductive or wet ground or in awkward corners where it is difficult to manoeuvre machinery.

EF2 Wild bird seed mixtures tended to be located in unproductive corners inconvenient for machinery, or along field edges to create a straight line for cultivation. Some farmers chose sheltered or undisturbed areas spread throughout their farms, others had targeted positions next to woods or watercourses, or places known to be good for shooting or as wildlife corridors.

EF4 Nectar flower mix – farmers had selected unproductive areas, or locations where they thought it would help with cross-compliance issues e.g. by reducing erosion or acting as buffers or to provide a straight edge for cultivation. Some farmers had placed patches next to bird seed mix, or selected areas to maximize benefit to wildlife such as next to woods & hedges, or locations where they had observed wildlife such as owls. Some nectar flower strips were placed near houses or footpaths because of their attractive appearance when in flower. On one farm they were grown next to an area of outdoor pigs to provide an attractive setting for marketing purposes.

EF6 Over-winter stubbles are rotated depending on crops and weed problems; some farmers mentioned restricting them to lighter soils.

EF7 Beetle banks were located in the middle of large fields; one was positioned next to an existing footpath.

EF8 Skylark plots were rotated in cereal fields away from field edge and tramlines.

EF10 Un-harvested cereal headlands for birds & rare arable plants generally follow the crop rotation. One farmer reported locating them where they would have the most environmental benefits depending on which field they were in.

EF11 Un-cropped cultivated margins for rare plants were placed around every field on one farm, while another had chosen a stretch on light soil adjacent to a wood and line of trees.

EF13 Un-cropped cultivated areas for ground-nesting birds on arable land had been placed in an area already used by lapwings.

EF15 Reduced-herbicide cereal crops followed by overwintered stubble was rotated around arable fields.

EF22 Extended overwinter stubbles were rotational on lighter ground.

EG1 Under-sown spring cereals were rotational. On one farm it was rotated with areas used by outdoor pigs.

Soil and water protection

Farmers provided responses to this question for 9 soil and water protection options.

EJ2 Management of maize crops to reduce soil erosion was rotated between fields with run-off problems.

EJ9 12m buffer strips for watercourses on cultivated land had been positioned next to watercourses, usually larger ones where run-off was an issue.

EJ10 Enhanced management of maize crops to reduce soil erosion and run-off was rotational.

EJ11 Maintenance of watercourse fencing had been placed where there were existing fences.

Grasslands

Farmers provided responses to this question for 134 non-SDA grassland options.

EK1 Field corners were generally located in inaccessible areas, or on wet land, or in one instance to replace a weedy area which had previously been used for bird cover.

EK2 Low input grassland: some arable farmers just had a small area of grass, not managed intensively and had put it all into the scheme. Other farmers had selected particular fields which had traditionally been managed with low inputs; one had selected an area with a lot of in-field trees, another had chosen some wet rush pastures. Farmers with more intensive grass often selected their less productive fields which were not cut for silage, or where only one cut was taken. Some fields were chosen because they were inconvenient because of small size, steep slopes or distance from the farmyard, while others were fields with archaeological features or which hadn’t been ploughed for a long time. Some farmers chose areas next to watercourses where the grassland provided a buffering effect as well as benefit to wildlife.

EK3 Very low input grassland: some of these were reported to be fields which had not received nitrogen fertilisers for years; some were chosen because they had archaeological features or were liable to flooding, or were small and inaccessible, others were the fields which didn't get cut for hay or silage. Some fields were chosen because they were next to watercourses or because they were free of thistles; others because they were crossed by a public footpath or had a lot of in-field trees.

EK4 Rush pastures were generally located in fields with existing rush areas but which were accessible to allow some control.

EK5 Mixed stocking was usually placed on pastures which had traditionally been used for cattle and sheep and so were appropriately fenced. Some fields were chosen because they were convenient for buildings and away from dairy cows.

Farmers provided responses to this question for 8 SDA grassland options.

EL2 Low input SDA grassland was usually placed on all eligible permanent pasture.

EL3 Very low input SDA grassland was located on fields with steep slopes or boggy ground.

EL6 unenclosed moorland rough grazing - generally all eligible land had been entered into the scheme.

4.3.9 Points allocations

4.3.9.1 Do you think the points for this option are about right, too high or too low?

For each option, farmers were asked whether they thought the points were about right, too low or too high; the responses are given in Table 86.

Table 86. Number of options with responses to the question: 'Do you think the points for this option are about right, too high or too low?'

(a) Numbers of options

CATEGORY	NON ETIP		ETIP			ETIP unknown		TOTAL		
	Too Low	About Right	Too Low	About Right	Too High[1]	Too Low	About Right	Too Low	About Right	Too High[1]
Boundaries	25	70	28	139	2	6	78	59	287	2
Trees & woodland	4	16	8	31		2	16	14	63	0
Historic & landscape	0	15	2	23		2	14	4	52	0
Buffers	5	14	10	44		8	22	23	80	0
Arable land	12	16	13	52		4	33	29	101	0
Soil & water	1	0	1	4		0	3	2	7	0
Grasslands	5	36	4	45	2	5	43	14	129	2
TOTAL	**52**	**171**	**66**	**339**	**4**	**27**	**209**	**145**	**719**	**4**

[1] 'Too high' was only reported as a response from farms in ETIP

(b) Percentages

CATEGORY	NON ETIP		ETIP			ETIP unknown		TOTAL		
	Too Low	About Right	Too Low	About Right	Too High	Too Low	About Right	Too Low	About Right	Too High
Boundaries	26%	74%	17%	82%	1%	7%	93%	17%	82%	1%
Trees & woodland	20%	80%	21%	79%		11%	89%	18%	82%	
Historic & landscape	0%	100%	8%	92%		13%	88%	7%	93%	
Buffers	26%	74%	19%	81%		27%	73%	22%	78%	
Arable land	43%	57%	20%	80%		11%	89%	22%	78%	
Soil & water	100 %	0%	20%	80%			100%	22%	78%	
Grasslands	11%	89%	8%	88%	4%	10%	90%	10%	89%	1%
TOTAL	**23%**	**77%**	**16%**	**83%**	**1%**	**11%**	**89%**	**17%**	**83%**	**0%**

The overall difference between ETIP and non-ETIP farms is significant as is that for options on arable land (5% level chi square test).

Over all types of option, the response from farmers was that they considered the points to be about right for 83% of options, too low for 17% and too high for less than 1%. 83% of those on ETIP farms were thought to be about right compared with 77% on non-ETIP farms and 89% on ETIP unknown. The very few farmers who thought points for some options too high were on ETIP farms. The main difference was for options on arable land where 80% of options were thought to be about right on ETIP farms compared to 57% on non-ETIP farms.

Boundaries

Eighty two percent of responses on boundary options considered that the points were ‘about right’, 17% ‘too low’ and 1% ‘too high’. The farmer who thought the points were too high commented that he thought it was too easy to get points for hedges. Other comments were that enhanced hedges received too many points compared to EB1/2 and just created open hedges which wouldn’t protect nesting birds. Those farmers who thought the points for hedge options too low commented that points needed to be higher to encourage farmers who didn’t like the longer cutting gap to stay in the scheme, and to compensate for extra damage to machinery. One farmer who was heavily reliant on hedges to get sufficient points had considered leaving the ELS scheme because he didn’t like the effect it was having on his hedges; another had considered withdrawing because he feared disputes over compliance. One farmer commented about his hedge/ditch option (EB8) that not being able to clear ditches more frequently was affecting his crop yield and therefore he needed more points in compensation. One farmer thought walls should be monitored more carefully, as he considered some farmers were getting paid for doing very little; he thought it would be better to be paid for each yard of wall that was rebuilt.

Trees and woodland

Eighty two percent of responses considered the points for tree and woodland options were about right, 18% too low, none too high. One farmer suggested points for in-field trees in arable fields should be higher because they are quite rare and a greater incentive is required

to ensure that they are protected. Another farmer commented on the income foregone as a result of leaving an uncultivated strip adjacent to his woodland.

Historic and landscape

Ninety three percent of responses considered the points for historic and landscape options were about right, 7% too low, none too high. Although some farmers were concerned about the costs of building maintenance, in general they accepted ongoing repairs as something they would do anyway. One farmer was very positive about the impact of this option in saving farm buildings from conversion and thus maintaining nesting sites for swallows.

Buffers

Seventy eight percent of responses considered the points for buffer options were about right, 22% too low, none too high. Some farmers commented that they thought points for buffers on arable land should be higher to reflect the crop foregone.

Options on arable land

Seventy eight percent of responses considered the points for arable options were about right, 22% too low, none too high. A number of farmers commented that this would depend on the price they could get for grain which varies annually. The wild bird seed and nectar flower plots represented a significant cost for seed especially where establishment was not successful or it was necessary to re-seed on a regular basis.

Soil and water protection

There were only six responses for these options so it is not possible to generalise.

Grasslands

Eighty nine percent of responses considered the points for grassland options were about right, 10% too low, 1% too high.. Farmers who thought the points too low for grasslands were mainly concerned to ensure they had enough grass for their livestock; they were worried about the lack of flexibility caused by ELS limits on fertiliser applications.

4.3.10 Advice

4.3.10.1 Was any advice sought regarding this option for your new agreement?

Farmers were asked for each option in their renewed agreement whether they had sought advice regarding that option when renewing their agreement; the responses are summarised in Table 87.

On ETIP farms, farmers reported having sought advice on 34% of options, considerably more than on NON-ETIP farms where farmers sought advice on 18% of options.

Table 87. Number of options with Yes or No response to the question: 'Was any advice sought regarding this option for your new agreement?'

CATEGORY	Non-ETIP		ETIP		ETIP unknown		TOTAL	
	Yes	% Yes	Yes	% Yes	Yes	% Yes	Yes	% Yes
Boundaries	22	17%	58	33%	29	30%	109	27%
Trees & woodland	0	0%	12	29%	6	30%	18	21%
Historic & landscape	6	35%	14	61%	8	50%	28	50%
Buffers	4	18%	20	36%	9	26%	33	29%
Arable land	7	21%	20	30%	12	30%	39	28%
Soil & water	0	0%	2	33%			2	20%
Grasslands	13	23%	16	31%	23	45%	52	33%
TOTAL	**52**	**18%**	**142**	**34%**	**87**	**33%**	**281**	**29%**

The difference between ETIP and non-ETIP farms is significant for the total and for the boundaries, and trees & woodland categories (5% level chi square test).

Advice was sought most frequently concerning the Historic and landscape options, least often about the Tree and woodland options (Table 87). Advice was sought more frequently on ETIP farms suggesting that farmers took the opportunity to ask for advice when it was freely and easily available as through the ETIP scheme.

Farmers could not always remember who had provided advice or whether it had come freely through ETIP, but Table 88 provides a summary of the responses received. On ETIP farms the largest source of advisors was FWAG, whereas on the non-ETIP farms, a higher proportion of farmers had obtained advice from land agents and independent consultants.

Table 88. Sources of advice received by farmers.

SOURCE OF ADVICE	NUMBER OF FARMS			% OF FARMS		
	Non-ETIP	ETIP	ETIP unknown	Non- ETIP	ETIP	ETIP unknown
ADAS		2			6%	
Commercial Agronomist	1			6%		
FWAG	2	12	3	11%	39%	13%
Independent consultant	5	6	5	28%	19%	21%
Land Agent	4	1	4	22%	3%	17%
Meeting	1	1		6%	3%	
Natural England	5	9	12	28%	29%	50%
Total	**18**	**31**	**24**	**100%**	**100%**	**100%**

There are insufficient data to allow a valid statistical test for significant difference between ETIP and non-ETIP farms.

Farmers were asked how easy it had been to access the advice they wanted (Very, Quite, Not); the responses are shown in Table 89.

Table 89. Accessibility of advice (Very/Quite/Not).

ACCESSIBILITY OF ADVICE	No	NON ETIP		ETIP			ETIP unknown			All Farms	
	Farms	Quite	Very	Quite	Very	Not	Quite	Very	Not	Quite	Very
ADAS	2			1	1					1	1
Commercial Agronomist	1	1								1	
FWAG	14	1		1	9		2	1		4	10
Independent consultant	16	1	4	2	4		1	4		4	12
Land Agent	8		3		1			4			8
Meeting	2	1		1						2	
Natural England	21	2	1	2	7	1		8	1	4	16
Total	**64**	**6**	**8**	**7**	**22**	**1**	**3**	**17**	**1**	**16**	**47**

There is insufficient data to allow a valid statistical test for significant difference between ETIP and non-ETIP farms.

Seventy six percent of ETIP farmers who answered the question found the advice very accessible compared to 57% on non-ETIP farms; there was only one report of a farmer not being unable to access the advice wanted.

Farmers were also asked how useful the advice had been (Very, Quite, Not); their responses are summarised in Table 90.

Eighty six percent of farmers on ETIP farms who responded and 71% of those on non-ETIP farms found the advice very useful; the rest quite useful; only one farmer reported that the advice received was not useful at all.

Table 90. Usefulness of advice received (Very/Quite/Not).

There is insufficient data to allow a valid statistical test for significant difference between ETIP and non-ETIP farms.

USEFULNESS OF ADVICE	No	NON ETIP		ETIP			ETIP unknown			All Farms	
	Farms	Quite	Very	Quite	Very	Not	Quite	Very	Not	Quite	Very
ADAS	2				2						2
Commercial Agronomist	1	1								1	
FWAG	14	1			10		2	3		2	12
Independent consultant	16		5	3	3		5	5		3	13
Land Agent	8		3		1		4	4			8
Meeting	2	1			1					1	1
Natural England	21	1	2	1	8	1	9	10	1	2	19
Total	**64**	**4**	**10**	**4**	**25**	**1**	**20**	**22**	**1**	**9**	**55**

Farmers were asked what sort of advice they had been seeking and for which options. 31 farmers gave reasons for seeking advice on 90 options:

Ten farmers wanted help with filling in the forms and working out the points. Eighteen farmers wanted general advice on which options were feasible for them and would fit with their current practices. Nine farmers asked for help in determining whether particular areas or features were eligible, e.g. farm buildings, and which was the best option to put them in e.g. hedges versus earth banks. Fourteen farmers asked for help in calculating points and deciding on the best combination of options to maximise flexibility. five farmers asked for help with details of option management; this was in relation to hedge management (3), buffer strips (3) and stubble fields (1). One farmer wanted help with estimating the cost of building maintenance. Six farmers asked more specific questions, e.g. pros and cons of putting an area down as woodland edge or buffer strip, choice of seed for field corners, best timing for cutting and establishing seed.

4.3.10.2 Do you think you will need further advice to manage this option?

Very few of the farmers interviewed, having just renewed their agreements, felt in need of further advice; the responses are shown in Table 91. Overall, farmers indicated a requirement for further advice on 4% of options, with little difference between ETIP and non-ETIP farms.

The need for more advice on boundaries related mainly to farmers who were doing something new, for example putting in new hedges or filling gaps, or transferring hedges which had been created under Countryside Stewardship into ELS. One farmer was concerned about dealing with weeds alongside a recently planted hedge.

Table 91. Number of options with Yes or No response to the question: 'Do you think you may need further advice to manage this option?

	NON ETIP	ETIP	ETIP unknown	ALL	NON ETIP	ETIP	ETIP unknown	ALL
No	279	400	242	921	97%	96%	94%	96%
Yes	10	17	15	42	3%	4%	6%	4%
Total	**289**	**431**	**257**	**963**	**100%**	**100%**		**100%**

There was concern with the woodland edge option, regarding weed control and how far to allow encroachment.

Farm buildings were causing concern at a couple of farms where advice was needed on costs and repairs.

Three farmers wanted further advice on buffer strips, specifically on weed control and the incorporation of wild flowers into strips which had already been established.

Farmers with options on arable land required more advice about controlling the spread of weeds and woody growth, and the establishment of wild bird seed mix.

One farmer with grassland options wanted further advice on increasing species richness; another with grassland field corners wanted to move them because they were in a location needed for stock access.

4.4 Scoring priority options with respect to key themes

Priority options are defined by Natural England as those that deliver the most benefit for the environment[9].

Scores were based on information derived from interviews and field surveys and were calculated for the following environmental themes and sub-themes:

- Farmland birds
- Lowland wildlife
    - Water voles, dragonflies, newts & toads
    - Bats and dormice
    - Butterflies, bees and vulnerable grassland
- Resource protection ('cleaner water and healthier soil')
    - Ground water
    - Surface water
- Historic environment

Analysis of scores was carried out to examine effects of priority area (whether or not the farm was located within a priority area for the environmental theme in question) and ETIP advice (whether or not the agreement holder had received advice through ETIP). As there are no priority areas for the historic environment, analysis for this theme was confined to effects of ETIP advice. Only priority options were scored as only these options are linked to the environmental themes and priority areas, and ETIP advice aims to increase their uptake.

The scoring system was based on a number of attributes for each option that were considered important for delivery of the expected environmental benefits from that option. For each attribute, a criterion was established to indicate an acceptable state for the attribute (see Appendix 1). If the criterion was fulfilled, a score of one was recorded, if not, a score of zero was given. Scores were then totalled and normalised by converting to a percentage of the maximum possible score (to take account of differing numbers of attributes for different options), then multiplied by the proportion of points devoted to that option within the agreement. The weighted scores were then summed for all options relevant to the theme in question within the agreement.

Analyses took the form of analysis of variance, performed by multiple regression on log-transformed data using GENSTAT. The statistical analysis was run on farms with known ETIP status, but means are also given for agreements with unknown ETIP status which contribute to the total figures.

In addition to the scores, points ratios (number of points allocated to priority options for the theme in question divided by the total number of agreement points) were also analysed, to give an indication of the extent to which any differences in scores were accounted for amount of option as compared to option quality.

The assessment criteria cover eligibility, condition and management. Each option has been scored for each farm; a summary of the scores achieved is provided in tabular form for each theme. Scores are included in the tables where it was possible to assess a farm option for

[9] www.naturalengland.org.uk/ourwork/farming/funding/es/agents/elsoptions/default.aspx.

at least 80% of the criteria; instances where less data was available have been excluded from the numeric analysis but are included in the comments on the criteria below.

4.4.1 Farmland birds

There are eleven key options which contribute to the farmland bird theme, of which six were recorded in the field survey; most of the data arise from the wild bird seed mix EF2 (see Table 94) which was the most prevalent of these options encountered on farms in the survey.

4.4.1.1 Farm agreements: weighted scores and points rations for farmland bird options

The mean weighted score for farmland bird options was greatest for ETIP farms in priority areas (Table 92). The points ratio is higher for ETIP farms and non-priority areas (Table 93). However, sample sizes were small and statistical analysis showed that the differences were not significant for either the weighted scores or the points ratios. Figure 28 illustrates the large variance around the mean for the weighted scores across the theme as a whole while Figure 30 displays the variation in scores for EF2 (wild bird seed mix) in particular.

Table 92. Weighted scores for options in the farmland bird theme.

	Non-ETIP		**ETIP**		**ETIP and Non-ETIP**	**ETIP unknown**		**All Agreements**
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*1*	5.74	*6*	8.21	7.85	*2*	11.33	8.63
Priority areas	*5*	4.71	*12*	13.21	10.71	*3*	0.75	9.22
Mean for all areas	***6***	**4.89**	***18***	**11.54**	**9.88**	***5***	**4.98**	**9.03**

Table 93. Points ratio % for options in the farmland birds theme.

	Non-ETIP		**ETIP**		**ETIP and Non-ETIP**	**ETIP unknown**		**All Agreements**
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*1*	25.82	*6*	16.13	17.51	*2*	29.17	20.10
Priority areas	*5*	10.47	*12*	22.31	18.83	*3*	7.19	17.08
Mean for all areas	***6***	**13.03**	***18***	**20.25**	**18.44**	***5***	**15.98**	**18.02**

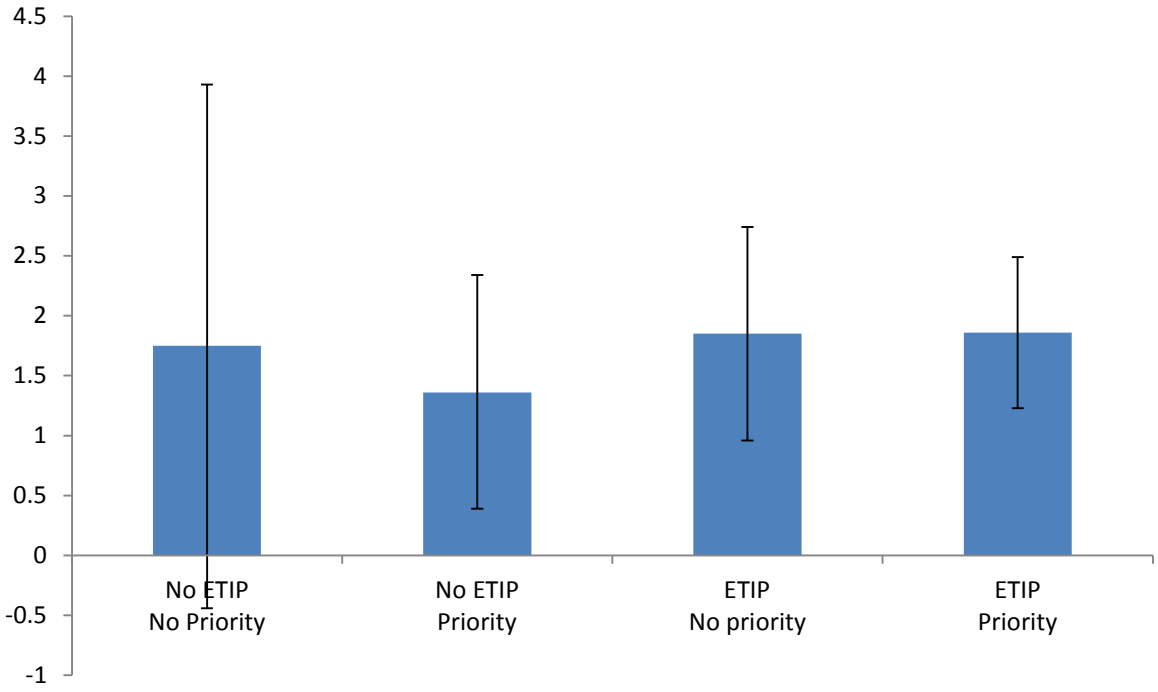


Figure 28. Farmland birds: mean log-transformed weighted scores with 95% confidence limits.

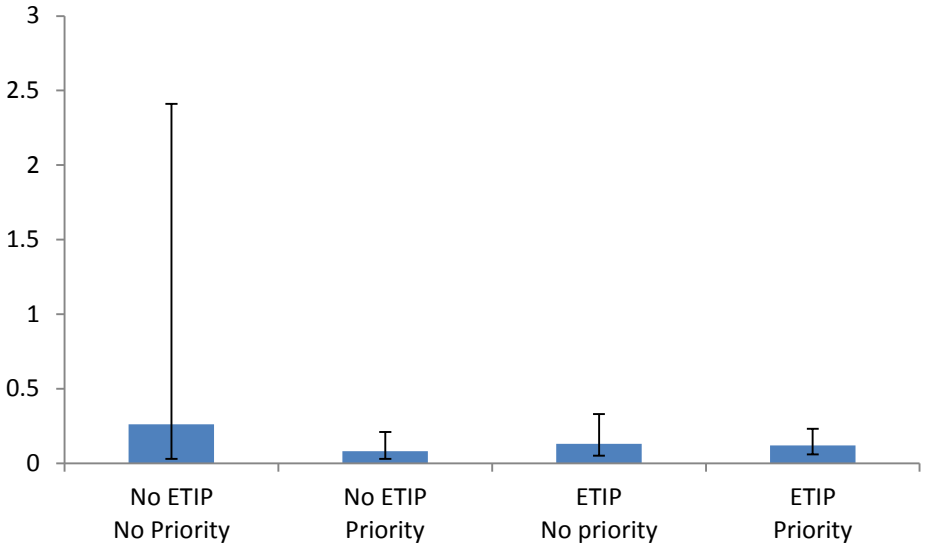


Figure 29. Farmland birds: mean point ratios with 95% confidence limits.

(Points ratios have been transformed to a log scale because of the skewed data distribution and then converted to a back-transformed scale, hence these means do not correspond to the means in Table 93).

4.4.1.2 Farmland birds: scores for individual options

The average score for farmland bird options was 53% which is the lowest of the themes analysed, reflecting the fact that most of these options are in or on the edge of intensively managed fields. However, there was considerable variation both between and within options. Of these options, only EF2 was encountered sufficiently often to allow generalisations; the figures for the other options are illustrative only.

Table 94. Average scores for ELS options relating to farmland birds.

Options	No. of farms	Mean score	*SE*	Max score	% of max score
EF2	23	4.7	*0.35*	9.7	48.7
EF6	4	5.1	*0.59*	8.3	62.9
EF8	3	6.3	*1.01*	9.7	64.8
EF11	1	1.0		8.0	12.5
EF13	2	4.8	*0.75*	10.5	45.0
EF22	1	10.0		12.0	83.3
ALL	**34**	**5.3**		**9.7**	**52.9**

(Max score is the mean maximum score which could have been achieved i.e. for which data were collected, so the % of max score column provides a score which is comparable across farms).

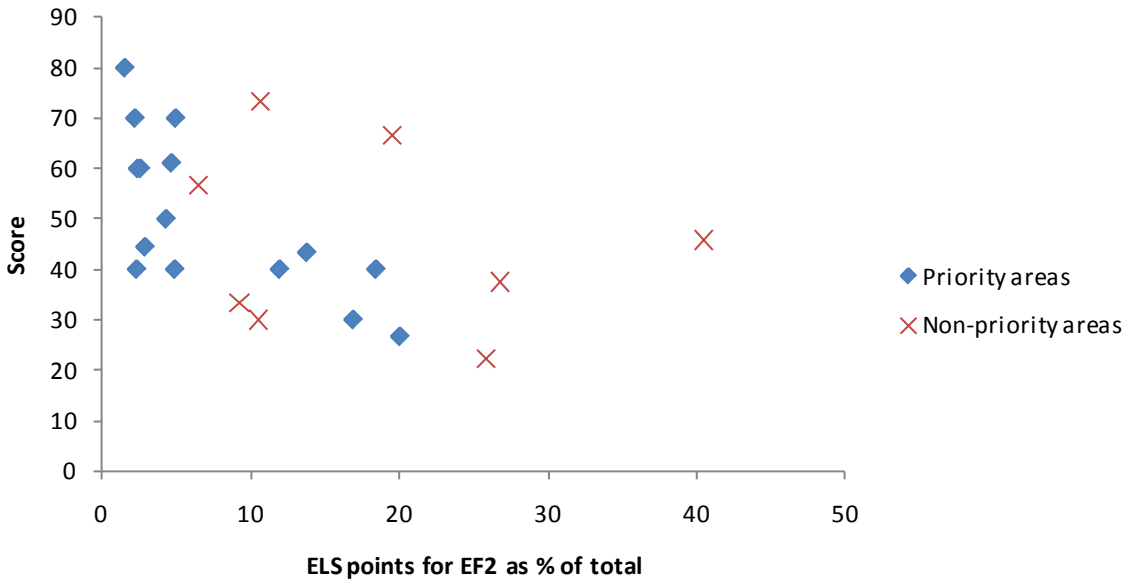


Figure 30. Scores for EF2 wild bird seed mix related to the proportion of agreement points earned by EF2, in and out of farmland bird priority areas.

Figure 30 shows the large variation in scores for EF2, wild bird seed mix, which was the most prevalent option surveyed in this theme. Regression analysis revealed a significant negative relationship (P=0.027) between the score achieved and the significance of EF2 in

terms of ELS points (proportion of total points), indicating the high impact of EF2 on the total score.

In-field nesting options

EF8 Skylark plots

ELS Skylark plots were assessed in eight fields on four farms, against ten attributes covering the location and size of the plots, time of establishment and weed cover. The plots had been established at the prescribed time in the right crops. However one field was too small, and in others the plots were too close to tramlines (1 field), woodland (4 fields) or field boundaries (3 fields). The plots were too small in 5 fields. The plots had the optimal level of weed cover of 10-60% in three of the fields. The farms scored between 45 and 80% showing considerable variability in how effectively this option was implemented.

EF13 Un-cropped areas for ground-nesting birds - recorded on two farms.

EF22 Extended overwinter stubbles - recorded on one farm.

Overwinter seed (EF2, EF6, EG4)

EF2 Wild bird seed mix

Wild bird seed mix is a popular ELS option which was assessed for 43 plots, with up to three examples on each of 23 farms. On all except one farm the EF2s were correctly located at field edges and were of the correct width, but only half the farms met the size criteria (0.4 – 2ha). Only half of the EF2 plots had three of the species specified in the handbook (and/or three others regarded as beneficial) present at the time of survey. Only 12% of the plots visited had a sown species cover of 50% or more, and only a third had 40% or more of sown species in flower or seed. There was a large variation in how well farms scored for EF2, ranging from 22-80%, with an average of 49% (see Table 94 & Figure 30).

EF6 Over-winter stubble

Five stubble fields were assessed from four farms. They were mostly located and managed according to the prescriptions. Four of the fields scored for desirable weed cover of 5% or more and three for broadleaved weed cover of 10% or more. Stubble height was assessed with fields scored where they had at least 30% less than 10cm and 30% more than 10cm; none of the fields achieved the first of these criteria but they all achieved the second.

EG4 Cereals for whole crop silage followed by overwinter stubble – none in sample

Insect-rich foraging habitats (EF9, EF10, EF11, EF15, EG1)

These options were either not recorded or only from one farm so it is not possible to comment on their management and performance.

4.4.2 Water voles, dragonflies, newts & toads

There are six key options which contribute to this theme which were assessed in the survey (see Table 97).

4.4.2.1 Farm agreements: weighted scores and points rations for water vole options

The mean weighted scores for the water vole options were higher for the non-ETIP farms, with the highest category being non-ETIP farms in priority areas. The mean points ratio was also higher on the non-ETIP farms, but neither set of results were statistically significant.

Table 95. Weighted scores for options in the water vole theme.

	Non-ETIP		**ETIP**		**ETIP and Non-ETIP**	**ETIP unknown**		**All Agreements**
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*4*	4.78	*10*	3.61	3.94	*4*	8.35	4.92
Priority areas	*10*	6.09	*17*	2.73	3.98	*9*	9.95	5.47
Mean for all areas	***14***	**5.71**	***27***	**3.06**	**3.96**	***13***	**9.46**	**5.29**

Table 96. Points ratio (%) for options in the water vole theme.

	Non-ETIP		**ETIP**		**ETIP and Non-ETIP**	**ETIP unknown**		**All Agreements**
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*4*	8.02	*10*	8.80	8.58	*4*	0.13	9.37
Priority areas	*10*	10.76	*17*	5.48	7.43	*9*	5.03	9.79
Mean for all areas	***14***	**9.97**	***27***	**6.71**	**7.83**	***13***	**2.58**	**9.65**

Figure 31 illustrates the large variance around the mean for the weighted scores across the theme as a whole and Figure 32 shows the variance in the point ratio, while Figure 33 displays the variation in scores for EB6 Ditch management in particular.

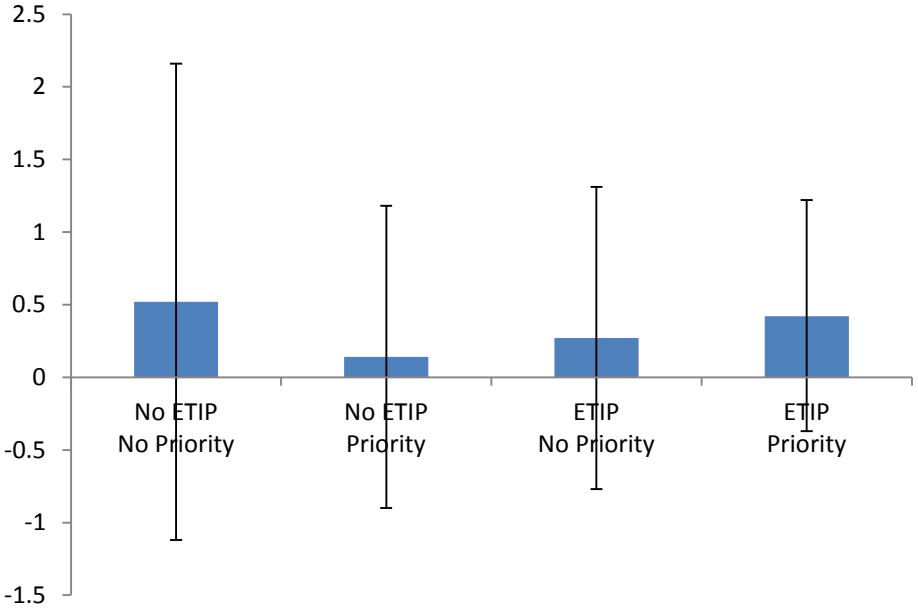


Figure 31. Water vole theme: mean log-transformed weighted scores with 95% confidence limits.

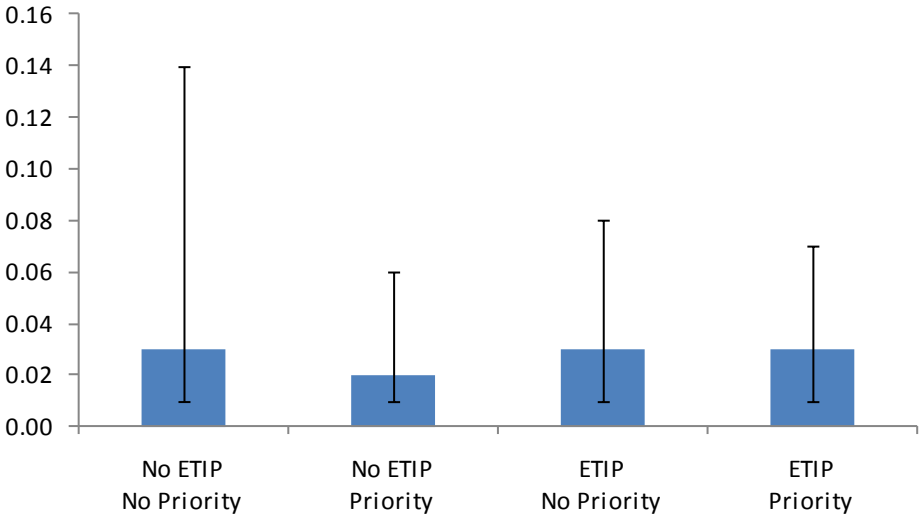


Figure 32. Water vole theme: mean points ratio with 95% confidence limits.

(Points ratios have been transformed to a log scale because of the skewed data distribution and then converted to a back-transformed scale, hence these means do not correspond to the means in Table 96).

4.4.2.2 Water voles: scores for individual options

Overall these options averaged a score of 60%, a little higher than the bird options, but there was still quite a lot of variation between and within options as shown in Table 97 and for EB6 in Figure 33.

Table 97. Average scores for ELS options relating to water voles, dragonflies, newts & toads.

Options	No. of farms	Mean score	*SE*	Max score	% of max score
EB6	36	6.2	*0.24*	12.4	49.6
EB7	15	6.2	*0.33*	12.6	49.3
EE7	7	5.1	*0.41*	8.5	60.1
EE8	4	5.5	*0.65*	9.3	58.9
EJ9	3	7.7	*0.84*	9.9	77.7
EJ11	6	3.9	*0.28*	6.0	64.8
ALL	**71**	**5.8**		**9.8**	**60.1**

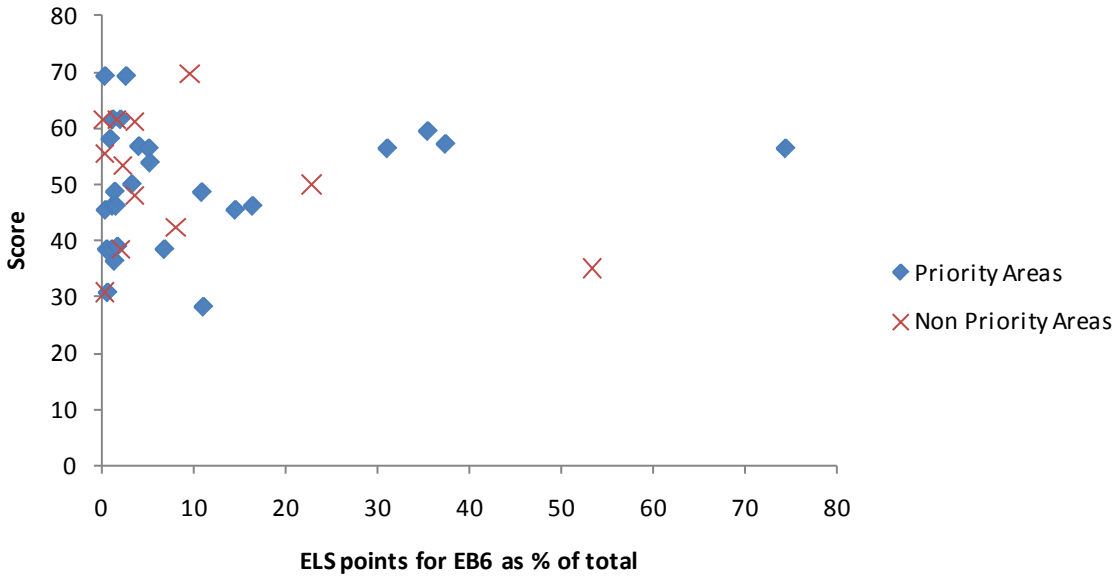


Figure 33. Scores for EB6 Ditch Management related to the proportion of agreement points earned by EB6, in and out of water vole priority areas.

Figure 33 shows the large variation in scores for EB6 ditches with no relationship between the score and the importance of ditches to a particular agreement, nor to priority area.

EB6 Ditch management & EB7 Half ditch management

Eighty five EB6 ditches were recorded on 39 farms and 37 EB7 ditches were recorded on 15 farms.

Many ditches did not meet eligibility criteria, for example about a quarter did not contain water at the time of survey and generally they had few of the submerged, floating or emergent species associated with high quality ditches. The bank-side vegetation suggested that management was frequently not optimal, for example only half the ditches had less than 20% of their banks in heavy shade, or had half of their banks covered with tall herb vegetation. On the positive side, non-native invasive species were recorded at only 3% of ditches surveyed.

EE7 Buffering in-field ponds in grassland & EE8 Buffering in-field ponds in arable land

Thirteen EE7 buffers and 2 EE8 buffers were recorded. They mostly failed to have the specified minimum of 10m between the pond and the intensively managed part of the field. Nearly half the ponds in grass fields had livestock access to more than half of the buffer. There was rarely any direct discharge into the ponds, algal cover was a problem on only one pond and all but two had at least one species of submerged, floating or emergent plant.

EJ9 12m buffers for watercourses on cultivated land

Seven EJ9s were recorded on three farms. They were all next to watercourses which contained water at the time of survey, with less than 30% of algal cover. However only two of the watercourses (both on the same farm) met the criterion for tall vegetation on at least one side with less than 20% shade. All the buffers met the requirements for width and cutting regime, but three had been established by sowing rather than natural regeneration. Livestock and vehicle use was a problem on only one buffer.

EJ11 Maintenance of watercourse fencing

Nine EJ11s were recorded on 5 farms. The adjacent watercourses all contained water and were clear of algae; five had submerged, floating or emergent native species present, but only two met the criterion for tall-herb vegetation. The fences were all stock-proof and in good condition.

4.4.3 Bats and dormice

There are six key options which contribute to this theme, four of which were recorded in this survey (see Table 100).

4.4.3.1 Farm agreements: weighted scores and point ratios for bats and dormice options

The mean weighted scores and the mean points ratio for priority areas are higher than for non-priority areas but the differences between these groups and between the ETIP and non-ETIP groups are not statistically significant. Figure 34 illustrates the large variance around the mean for weighted scores across the theme as a whole while Figure 36 displays the variation in scores for EB3 in particular.

Table 98. Weighted scores for options in the bats and dormice theme.

	Non-ETIP		**ETIP**		**ETIP and Non-ETIP**	**ETIP unknown**		**All Agreements**
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*14*	12.35	*14*	7.51	9.93	*16*	7.8	9.15
Priority areas	*2*	7.74	*9*	14.35	13.15	*4*	13.18	13.16
Mean for all areas	***16***	**11.77**	***23***	**10.18**	**10.17**	***20***	**8.88**	**10.00**

Table 99. Points ratio (%) for options in the bats and dormice theme.

	Non-ETIP		ETIP		ETIP and Non-ETIP	ETIP unknown		All Agreements
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*14*	16.81	*14*	9.25	16.04	*16*	10.38	12.06
Priority areas	*2*	10.64	*9*	16.98	12.27	*4*	15.75	15.81
Mean for all areas	***16***	**16.04**	***23***	**12.27**	**13.82**	***20***	**11.45**	**13.02**

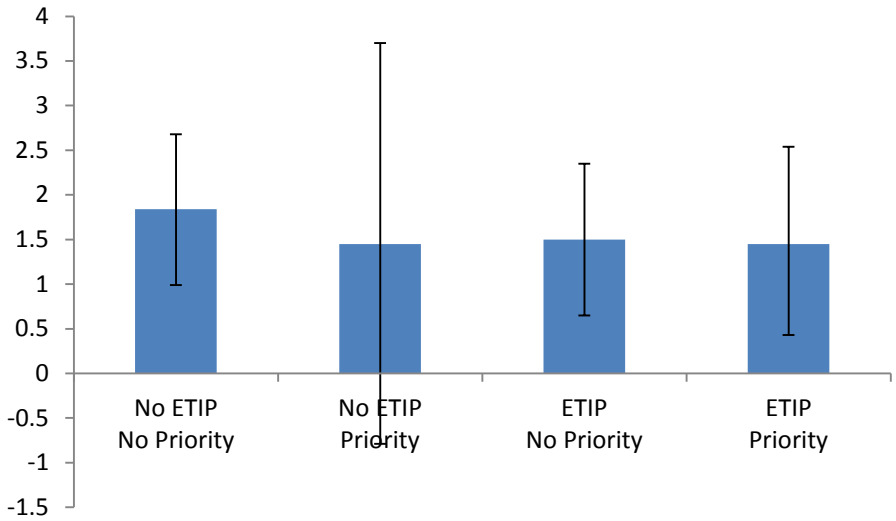


Figure 34. Bats and dormice: mean log-transformed weighted scores with 95% confidence limits.

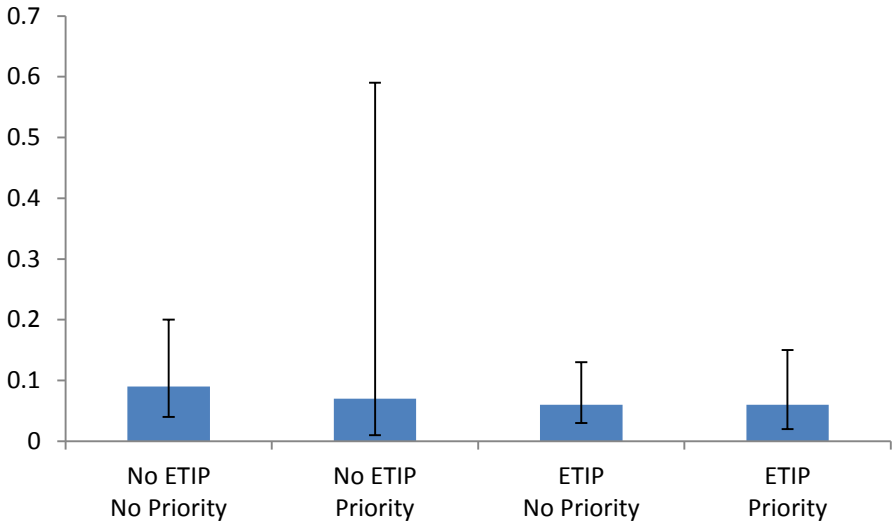


Figure 35. Bats and dormice: mean points ratios with 95% confidence limits.

(Points ratios have been transformed to a log scale because of the skewed data distribution and then converted to a back-transformed scale, hence these means do not correspond to the means in Table 99).

4.4.3.2 Bats and dormice: scores for individual options

The average score for this theme was 70% which is higher than for the farmland birds and the water voles.

Table 100. Average scores for ELS options relating to bats and dormice.

Options	No. of farms	Mean score	*SE*	Max score	% of max score
EB3	49	6.9	*0.15*	8.8	76.3
EC3	19	2.5	*0.22*	4.0	62.7
EC4	7	4.3	*0.29*	6.4	67.6
EC25	1	5.0		7.0	71.4
ALL	**76**	**4.7**		**6.5**	**69.5**

Figure 36 shows the variation in scores for EB3 (Enhanced hedgerows) which was the most prevalent option encountered for this theme. The scores were higher and somewhat more consistent than for EF2 (Figure 7) and EB6 (Figure 10). The plot indicates that there is no relation between the score achieved and the significance of EB3 in terms of ELS points as a proportion of agreement points, but it can be seen that scores were generally higher within the priority areas.

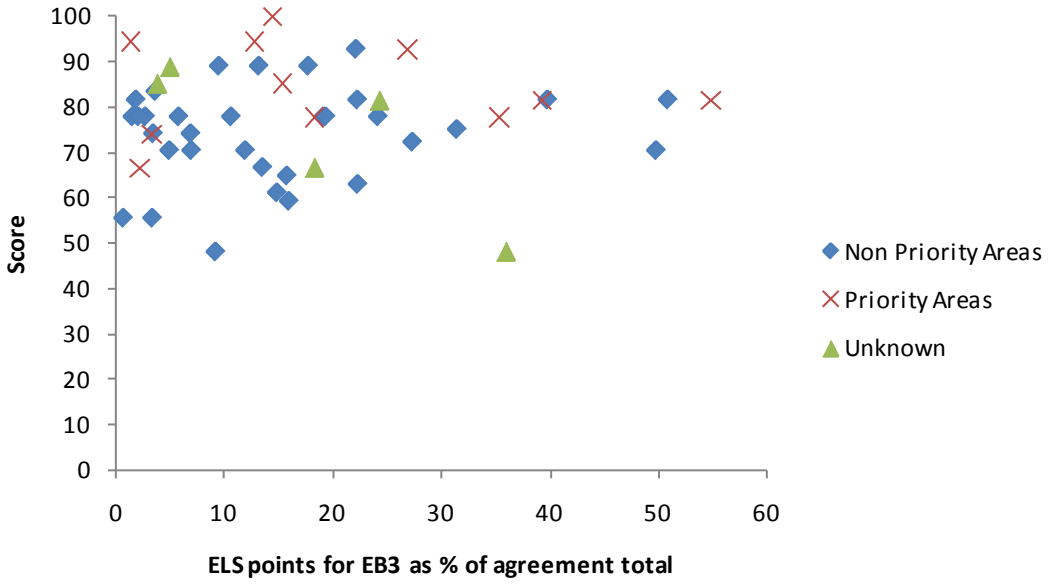


Figure 36. Scores for EB3 Enhanced hedgerows related to the proportion of agreement points earned by EB3, in and out of priority areas.

EB3 Enhanced hedgerow management

In total, 126 EB3s were recorded on 51 farms. 51% were located at the edge of woodland or scrub or included mature hedge trees, making them important for bats and dormice. Seventy four percent were assessed as 'clearly old' by surveyors, and 30% had an average of four (in

the north) or 5 native woody species per 30m length. Ninety four percent met the height requirements (2m) and 92% the width requirements (1.5m), however 20% had more than 10% gaps in total or one gap of more than 5m, thus reducing their usefulness to species like dormice which avoid crossing gaps.

EC3 Maintenance of woodland fences

Fifty six EC3s were recorded on 23 farms. Seventy one percent of the woods enclosed were of native species, of mixed age, but 12% were plantations as indicated by the trees being in rows. Forty one percent did not have ground flora typical of old woodland. Ninety five percent of fences were in good condition, but 38% had less than 2m of perennial herbaceous vegetation between the woodland fence and cultivated land or managed grassland.

EC4 Management of woodland edges

Twelve EC4s were recorded from eight farms. Five of the woods involved did not have 90% native species of mixed age, two others were planted in rows and only two had a woodland ground flora, so only two edge strips met the eligibility criterion. Five strips failed to meet the minimum width requirement of 6m. None of them were affected by supplementary feeding or poaching. Three woodland edges had adjacent buffer strips thus extending the benefit.

EC23 and EC24 were not recorded and there was only one EC25 in the sample.

4.4.4 Butterflies, bees and vulnerable grassland

There are five key options which contribute to this theme and which were assessed in this survey - see Table 103.

4.4.4.1 Farm agreements: weighted scores and points rations for butterflies, bees and vulnerable grassland

The mean weighted scores for the butterflies and bees theme were higher on non-ETIP farms (Table 101); this difference is statistically significant (F-test probability =0.013). There was only a small, non-significant, difference between scores from the priority areas and non-priority areas.

Table 101. Weighted scores for options in the butterflies and bees theme.

	Non-ETIP		**ETIP**		**ETIP and Non-ETIP**	**ETIP unknown**		**All Agreements**
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*18*	23.10	*27*	12.12	16.51	*20*	15.42	16.17
Priority areas	*9*	20.58	*17*	14.89	16.86	*13*	11.30	15.01
Mean for all areas	***27***	**22.26**	***44***	**13.19**	**16.64**	***33***	**13.79**	**15.74**

Analysis of the points for theme options, as a ratio of the total agreement points, also shows a statistically significant difference between ETIP and non-ETIP farms (see Table 102). There is a higher points ratio on non-ETIP farms (F-test probability =0.006). This suggests that the difference between ETIP and non-ETIP farms reflects a different distribution of options in farm agreements, affecting the weighting factor, rather than a significant difference in individual condition scores. This is considered in more detail in the next section through examination of individual options.

Table 102. Points ratio (%) for options in the butterflies and bees theme.

	Non-ETIP		ETIP		ETIP and Non-ETIP	ETIP unknown		All Agreements
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*18*	38.73	*27*	21.34	26.85	*20*	31.52	29.29
Priority areas	*9*	42.63	*17*	24.10	34.22	*13*	19.84	26.96
Mean for all areas	***27***	**40.03**	***44***	**22.41**	**29.55**	***33***	**26.92**	**28.41**

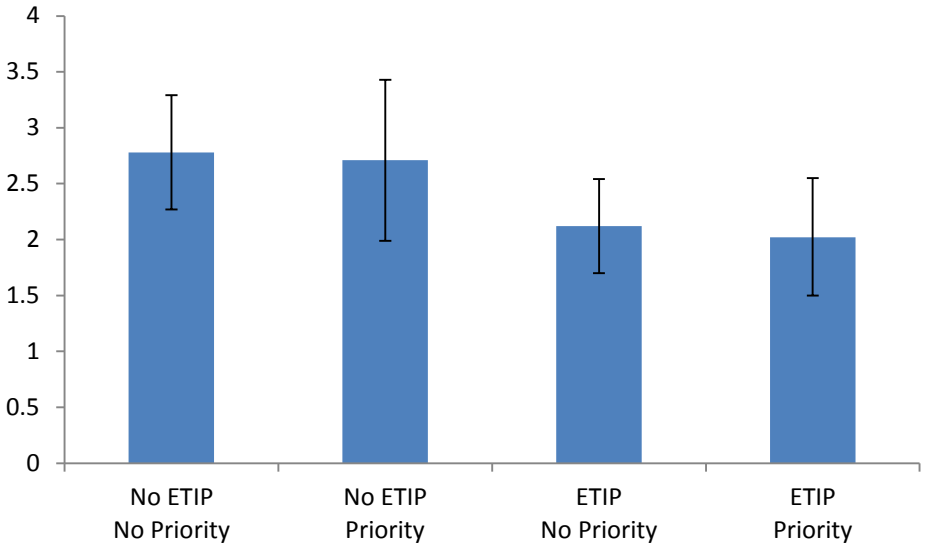


Figure 37. Butterflies and bees: mean log-transformed weighted scores with 95% confidence limits.

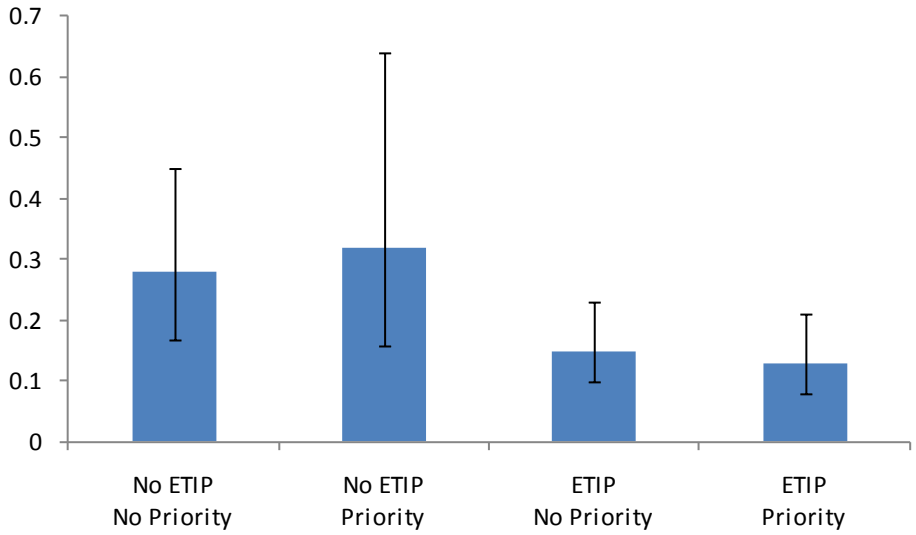


Figure 38. Butterflies and bees: mean points ratios with 95% confidence limits.

(points ratios have been transformed to a log scale because of the skewed data distribution and then converted to a back-transformed scale, hence these means do not correspond to the means in Table 102).

4.4.4.2 Scores for individual options

Scores for this theme averaged 58% (see Table 103), better than the farmland bird theme but not as good as the water vole and bat themes, perhaps because the options include field as well as edge habitat.

Table 103. Average scores for ELS options relating to butterflies, bees and vulnerable grasslands.

Options	No. of farms	Mean score	*SE*	Max score	% of max score
EB3	50	6.4	*0.16*	8.6	73.9
EC4	8	4.3	*0.38*	7.3	59.9
EF1	40	2.9	*0.13*	4.8	61.3
EF4	16	4.9	*0.41*	9.7	50.9
EK3	55	2.9	*0.18*	6.7	43.9
ALL	**169**	**4.3**		**7.4**	**58.0**

The statistical analysis of the weighted scores across all the theme options (discussed in4.4.4.1), identified the difference in weighted scores between ETIP and non-ETIP farms. Table 104 shows these weighted scores for the component options; EK3 (very low input grassland) is the only option which shows a large difference, having a higher mean score for farms which did not participate in ETIP. Table 49 shows very little difference between the un-weighted scores for EK3, indicating that it is not the implementation of EK3 which is responsible for the difference.

Table 104. Mean weighted scores for key options, by ETIP status.

	N	EB3	EC4	EF1	EF4	EK3
No ETIP	15	13.61	0.13	8.48	3.21	22.54
ETIP	20	12.84	1.01	6.27	5.16	9.15
Unknown	14	10.49	1.44	9.87	2.39	10.47
Total	**49**	**12.28**	**1.01**	**8.07**	**4.03**	**13.63**

Table 105. Mean (un-weighted) scores for key options, by ETIP status.

	N	EB3	EC4	EF1	EF4	EK3
No ETIP	15	73.25	46.88	56.67	46.62	43.17
ETIP	20	75.43	57.86	54.98	55.83	47.98
Unknown	14	73.79	71.43	66.41	39.17	41.33
Total	**49**	**74.31**	**59.88**	**59.41**	**49.55**	**44.61**

Figure 39 shows the considerable variation in the scores for EK3 (from zero to 100%). The difference between ETIP and non-ETIP farms is not so much in the scores but in the proportion of points gained from EK3; the group of farms with a high proportion of points coming from EK3 (on the right-side of the graph) are mostly non-ETIP and it is these which are making a significant difference between the two groups in the weighted scores. Further details of how EK3 swards performed regarding specific attributes are given below.

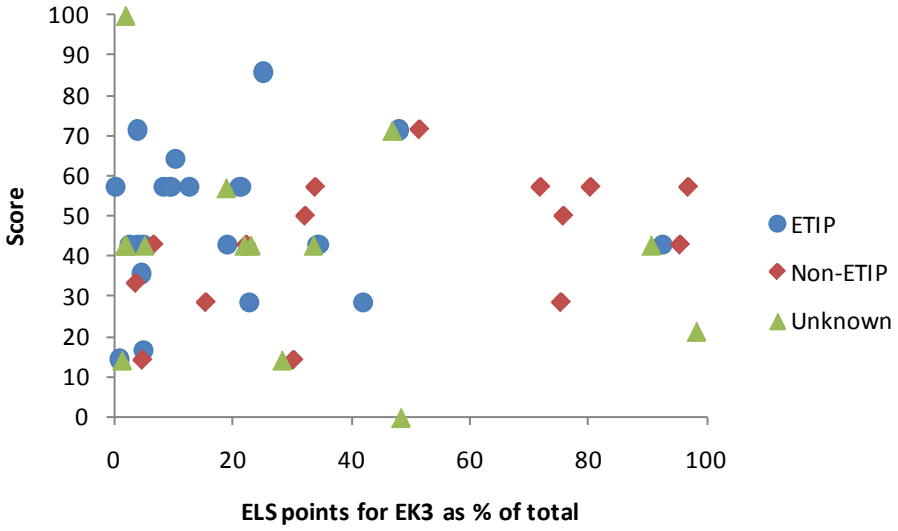


Figure 39. Scores for EK3, very low input grassland, related to the proportion of points earned by EK3, and to participation in ETIP.

EB3 Enhanced hedgerow management

In addition to the features recorded for EB3 for the bats and dormice theme, to assess the provision for butterflies and bees, these hedges were also scored on the basis of the floral resources provided. Evidence of flowers or fruits along at least half of a 30m length was

found in 20% of EB3 hedges surveyed. About 50% of hedges had at least a 10% cover of insect-pollinated broadleaved herbs in the margin strip.

EC4 Management of woodland edges

In addition to the features mentioned above (see bees and dormice), the availability of insect-pollinated herbs was assessed. Forty two percent of woodland edges had at least 10% cover of insect-pollinated broadleaved herbs in the woodland edge. Half of the woodland edges were north-facing and therefore of less benefit to butterflies and bees, which prefer to be on the sunny side.

EF1 Management of field corners on arable land

Ninety one field corners managed as EF1 were recorded on 40 farms. About a third of these had hedges or woodland on their north edge, providing a sheltered sunny area suitable for butterflies and bees. 73% of the field corners had developed by natural regeneration or had been sown with a mix which included wild flowers. 84% of the field corners provided at least 10% cover of insect-pollinated herbs.

EF4 Nectar flower mix

Twenty nine Nectar flower mix plots were recorded from 16 farms. Ninety percent were located at field edges and 28% on the southerly side of a hedge or wood. Some farmers reported difficulties in establishing some of their nectar flower mix plots and this was reflected in the number and cover of sown species. Surveyors recorded the required minimum of four species from a prescribed list in only 31% of plots, and a cover of at least 75% listed species in only 17% of plots. However a flower abundance of at least 30 per square metre (not just sown species) was recorded in 79% of plots. Over half of the plots had more than 10% undesirable weeds. The prescription recommends cutting half the area in late June to stimulate late flowering and then the whole area in the autumn but farmers reported doing the summer cut for only 45% of plots and the autumn cut for 50% of plots. Some plots were cut at the wrong time or not at all. Farmers reported removing or shredding cuttings on 41% of plots.

EK3 Very low input grasslands (non-SDA)

EK3 fields were recorded on 56 farms. These grasslands were assessed on species diversity (number per square metre), cover of wildflowers and sedges and cover of ryegrass and white clover as in Key 2a of the FEP handbook. As defined by these criteria only 8% were unimproved, 35% semi-improved and 56% improved.

The ELS prescription for EK3 fields which are grazed requires the maintenance of a sward with a range of heights during the growing season so that at least 20 per cent of the sward is less than 7 cm and at least 20 per cent is more than 7 cm, to allow plants to flower and to provide a more varied habitat. Only 25% of the fields surveyed met the first of these criteria, but 91% met the second, i.e. there was plenty of longer grass but a lack of closely grazed areas.

Surveyors also estimated the cover of insect-pollinated herbs. Seventy one percent of fields were assessed to have at least 10% cover of these plants, and 40% to have at least 20% cover.

4.4.5 Resource protection

There are fourteen key options which contribute to the resource protection theme, ten of which were recorded in this survey (see Table 110). There are three spatial sub-themes related to priority areas for resource protection: ground water, surface water and shellfish/bathing waters. Scores were analysed for ground water and surface water, but there were insufficient data to analyse the shellfish/bathing water category[10].

4.4.5.1 Farm agreements: weighted scores and points ratios for resource protection options

For ground water options, higher weighted scores were achieved by farms in non-priority areas compared to priority areas, and on non-ETIP farms compared to ETIP farms, but only the latter difference was statistically significant (F probability = 0.008).

Table 106. Resource protection: weighted scores for ground water options.

	Non-ETIP		ETIP		ETIP and Non-ETIP	ETIP unknown		All Agreements
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*24*	47.88	*23*	28.70	38.49	*27*	40.83	39.35
Priority areas	*8*	43.32	*12*	21.33	30.12	*6*	28.85	29.83
Mean for all areas	***32***	**46.74**	***35***	**26.17**	**36.00**	***33***	**38.66**	**36.87**

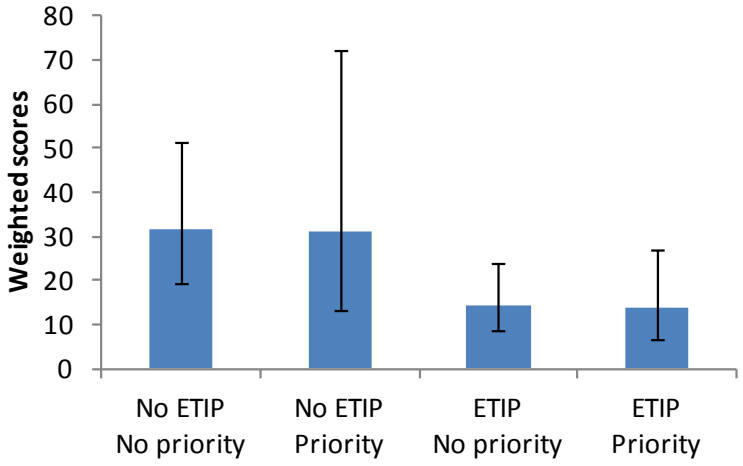


Figure 40. Ground water: mean weighted scores with 95% confidence limits.

(the analysis was done on a log-transformed scale as the data are very skewed, hence these back-transformed predicted means do not match the observed means).

[10] There are only two options related to this category: EE10 (6m buffer strips next to a watercourse on intensive grassland) and EJ11 (maintenance of watercourse fencing).

For surface water options, the weighted scores were highest on non-ETIP farms in non-priority farms but the differences were not significant at 5%; (F probability for difference between priority and non-priority areas was close to significance at 0.055).

Table 107. Resource protection: weighted scores for surface water options.

	Non-ETIP		ETIP		ETIP and Non-ETIP	ETIP unknown		All Agreements
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*6*	25.36	*9*	18.82	21.43	*8*	27.21	23.44
Priority areas	*5*	11.58	*13*	15.43	14.36	*10*	6.94	11.71
Mean for all areas	***11***	**19.09**	***22***	**16.82**	**17.58**	***18***	**15.2**	**16.71**

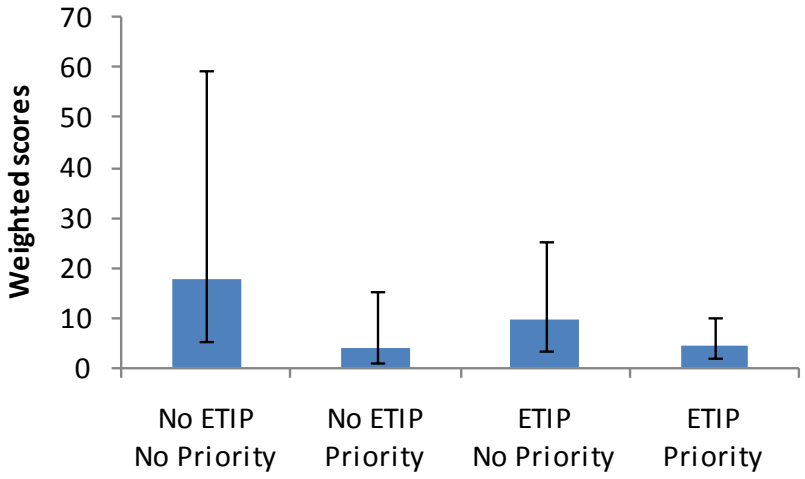


Figure 41. Surface water: mean weighted scores with 95% confidence limits.

(The analysis was done on a log-transformed scale as the data are very skewed, hence these back-transformed predicted means do not match the observed means).

For ground water options, the points ratios were very similar in priority and non-priority areas, but were significantly higher on non-ETIP farms than ETIP farms (F probability = 0.014).

Table 108. Points ratio (%) for ground water options.

	Non-ETIP		ETIP		ETIP and Non-ETIP	ETIP unknown		All Agreements
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*24*	47.10	*23*	31.03	39.24	*27*	38.85	39.10
Priority areas	*8*	51.99	*12*	27.40	37.23	*6*	35.35	36.80
Mean for all areas	***32***	**48.32**	***35***	**29.78**	**38.64**	***33***	**38.21**	**38.50**

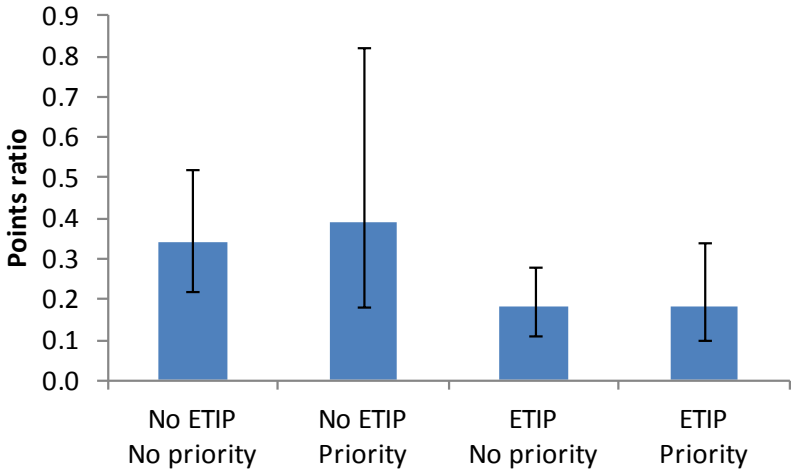


Figure 42. Ground water: mean points ratios with 95% confidence limits.

(The analysis was done on a log-transformed scale as the data are very skewed, hence these back-transformed predicted means do not match the observed means).

For surface water options, there was no significant difference between ETIP and non-ETIP farms, but farms in the non-priority areas did have significantly higher scores than those in the priority areas (F probability 0.041).

Table 109. Points ratios (%) for surface water options.

	Non-ETIP		ETIP		ETIP and Non-ETIP	ETIP unknown		All Agreements
	N	Mean	*N*	Mean	Mean	*N*	Mean	Mean
Non-priority areas	*6*	21.70	*9*	15.59	18.03	*8*	24.53	20.29
Priority areas	*5*	13.50	*13*	12.57	12.83	*10*	10.67	12.06
Mean for all areas	***11***	**17.97**	***22***	**13.80**	**15.19**	***18***	**16.83**	**15.77**

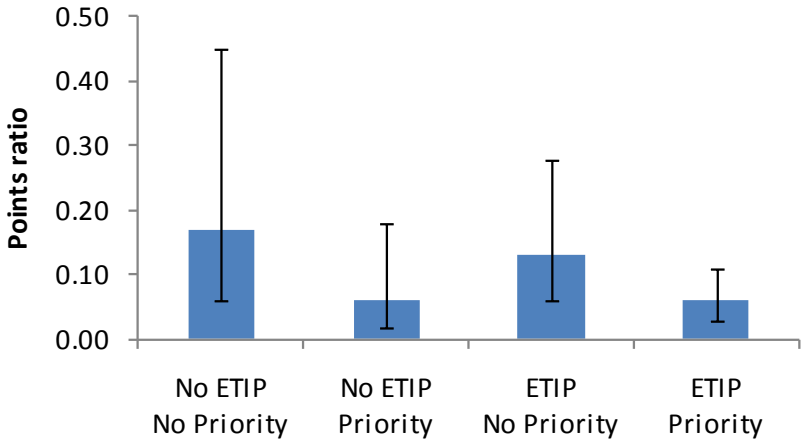


Figure 43. Surface water: mean points ratios with 95% confidence limits.

(The analysis was done on a log-transformed scale as the data are very skewed, hence these back-transformed predicted means do not match the observed means).

4.4.5.2 Resource protection: scores for individual options

The average score for resource protection options was 69% (Table 110), but again there was a lot of variation in scores for some options. Figure 44 shows the scores for EE9 (6m buffers next to watercourses on cultivated land); these are very variable compared to EE10 (6m buffers next to watercourses on grassland) which are quite consistent, around the very similar means.

Table 110. Average scores for ELS options relating to resource protection.

Options	Surface/ Ground water	No. of farms	Mean score	*SE*	Max score	% of max score
EF1	SW	40	3.7	*0.15*	6.0	61.3
EF7	SW	2	4.2	*0.33*	6.5	64.7
EK1	SW	3	7.3	*0.17*	8.0	91.7
EK2	GW	65	4.4	*0.12*	5.9	73.5
EK3	GW	55	4.2	*0.12*	5.9	71.7
EK4	GW	5	1.8	*0.49*	3.0	60.0
EE9	SW	8	7.3	*0.55*	12.8	56.6
EE10	SW	7	7.3	*0.20*	10.7	69.5
EJ9	SW, GW	3	10.0	*1.01*	14.0	71.0
EJ11		5	1.4	*0.24*	2.0	70.0
ALL		**193**	**5.1**		**7.5**	**69.0**

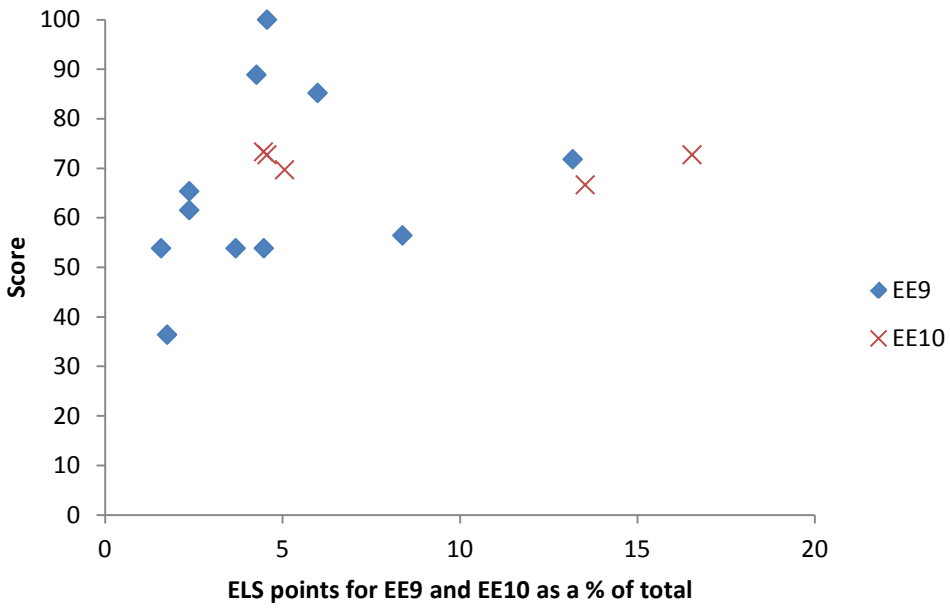


Figure 44. Scores for 6m buffer strips next to watercourses on cultivated land EE9 and grassland EE10, related to the proportion of points earned by these options.

EG1 Under-sown spring cereals

This option was assessed on only one farm and field assessments were undertaken on swards sown in 2011 because the farmer had been unable to establish the crop in 2012 due to adverse weather conditions.

EF1 Management of field corners

This option was assessed on 47 farms. Condition scores were highly variable between farms (1-5.3: max 6) although no attributes consistently had low scores. Half of farmers were cutting more frequently than stipulated (more than once every five years) and a similar proportion of features were not placed where they could reduce erosion or stop sediment entering a watercourse. However, 82% of features had a maximum of 10% bare ground or dead vegetation.

EK1 Take field corners out of management

Field corners were assessed on only five farms, but all attributes scored highly on all features assessed. The only exception was the proportion of undesirable species (injurious weeds/alien invasives) which was high on two features.

EF7 Beetle banks

Six features were recorded on only two farms. The features assessed were sufficiently wide, had good vegetation cover and low cover of undesirable species (injurious weeds & invasive aliens). However, only one feature was positioned across a slope, although fields were generally only slightly sloping (1-2º).

EK2 Permanent pasture with low inputs

This option was recorded on 67 farms. On one farm only 17% of the scoring criteria were met, however on other farms between 50 and 100% of the criteria were met. Only one third of farms had placed this feature on vulnerable soil types (sand, light silt, peat or clay) and only half of the farms assessed had no compaction or poaching. However, vegetation cover and cover of undesirable species usually met the criteria set.

EK3 Permanent pasture with very low inputs

This option was assessed on 58 farms and results were very similar to those for EK2, although a higher proportion (35%) had no compaction or poaching. Only two farms met less than 50% of the criteria. Thirty six percent of farms had not placed the features on high risk soil types and just over half of fields in this option were flat, so that erosion and runoff were likely to be less of a problem.

EK4 Management of rush pastures

The option was assessed on only six farms and only three attributes contributed to the scoring criteria. Scores were variable with one farm meeting none of the criteria and one meeting all three.

EE9 6 m Buffer strip on cultivated land next to a watercourse

A total of 32 features were assessed on 17 farms. Overall scores were variable, with between 36 and 88% of criteria met. Management criteria tended to score low with few farmers cutting the 3 m next to the crop or removing cuttings. Only one third of features

were located at the bottom of a slope where they would benefit resource protection; many of the other features were in flat fields. However, most features were located next to a watercourse, were at least 6 m wide and had low proportions of bare ground and dead vegetation.

EE10 6 m Buffer strip on intensive grassland next to a watercourse.

Twenty features were assessed on seven farms with fairly similar scores across farms (58-73%). All features were recorded against a watercourse, however only 40% were located at the bottom of a slope, with the remainder running down a slope or placed in a flat field. Only two features had evidence of compaction or trafficking, and most features met the criteria for the maximum cover of bare ground or dead vegetation and undesirable species.

EJ9 12 m Buffer strips for watercourses on cultivated land.

This option was recorded on only three farms (seven features). Farm scores for this option ranged from 58 to 83% but there were no attributes that had consistently low scores.

EJ11 Maintenance of watercourse fencing.

This option was present on five farms (nine features), however only two criteria were assessed. For all features, fencing was stock-proof and in good condition. However, only two features had a buffer strip option next to the watercourse.

No data are available for: EJ2, EJ10, EJ13 or EJ5.

4.4.6 Historic environment

There are five key options for the historic theme of which four were encountered in this survey (see Table 112). There is no priority area for the historic theme so these data have been analysed only with respect to their ETIP status.

4.4.6.1 Farm agreements: weighted scores for historic options

The mean weighted score was higher on ETIP farms but the difference between ETIP and non-ETIP was not statistically significant. There are no priority areas for historic options.

Table 111. Weighted scores for options in the Historic theme.

ETIP status	N	Average Weighted Score
ETIP	21	16.46
Non-ETIP	12	13.99
Total ETIP/Non-ETIP	33	15.56
Unknown	12	25.42
Total	**45**	**18.19**

4.4.6.2 Historic environment: scores for individual options

The average score for these options was 85%. These scores were higher and more consistent than for the bird and wildlife themes, indicating that eligibility and management criteria were more successfully applied.

Table 112. Average scores for ELS options relating to the historic environment.

Options	No. of farms	Mean score	*SE*	Max score	% of max score
ED1	34	2.6	*0.11*	2.9	90.9
ED2	2	5.0	*1.00*	6.0	83.3
ED3	1	4.0		5.0	80.0
ED5	13	5.2	*0.23*	6.0	87.2
ALL	**50**	**4.2**		**5.0**	**85.3**

ED1 Maintenance of weatherproof traditional farm buildings

56 Farm buildings were assessed on 34 farms. Of these, four failed on eligibility criteria, seven on condition and six on materials used for repairs.

Archaeology: only two examples of ED2 'Archaeology on cultivated land' were encountered in the survey and one example of ED3 'Reduced depth non inversion cultivation on archaeological features'.

ED5 Archaeological features on grassland

Nineteen examples of ED5 were recorded on 13 farms. Three had patches of bare ground exceeding 4 square meters, four showed signs of supplementary feeding and two had areas of scrub. Five ED5s showed signs of compaction by vehicles; one was being used for storage.

4.5 Attributes assessed at interview

Interviews included a series of questions about how ES features were managed for each option, which are summarised here for non-priority options. A range of attributes were assessed to establish the quality of management. A subset of attributes relate directly to option prescriptions and are used to assess the degree of compliance. Farms receiving or not receiving ETIP advice are separated for buffer strip location as it was felt that this could have been influenced by ETIP advice. However other aspects are not considered separately in relation to ETIP advice, as providing advice on management is not within the remit of the programme.

Responses are presented for individual options on each farm, however a single farmer with multiple options would be counted more than once. Throughout this section of the report where data are presented for multiple options, 'farmers' 'holdings' or 'options' refers to farm/option combinations. Where data are presented for options individually, responses from farmers will be presented for each option in their agreement.

4.5.1 Hedgerow management for landscape and wildlife

Hedgerow management for landscape and wildlife has the options E/OB1, 2 (control of both sides and of one side of the hedgerow respectively), and E/OB3 (enhanced management with control of both sides of the hedgerow) for hedgerows on their own. There are also options E/OB8, 10 (combined hedge and ditch management) for hedgerow options E/OB1, 3 respectively that are immediately adjacent to ditches that meet the eligibility criteria for the ditch options E/OB6 (control of both banks); option E/OB9 for hedgerow option E/OB2 immediately adjacent to ditches that qualify for the ditch option E/OB7 (control of one bank).

For options E/OB1, 2, 8, 9 the scheme prescription states that hedgerows should not be cut more than once every two years and for options E/OB3, 10 the cutting interval is increased to once every three years. For options E/OB1, 2, 8, 9 there were only three holdings that failed this target and were cut every year, one (3%) with option E/OB8 and two (2%) with option E/OB2 (Table 113). A positive benefit was noted as 20-29% of holdings across this group of options were cutting their hedges less frequently than required, similar to the interval for enhanced hedgerow management options E/OB3/10 (Table 113).

For the E/OB3, 10 options, there were no holdings cutting every year; however there were nine (17%) and one (10%) holding(s) respectively, failing the prescription as they were cutting every two years (Table 113). Hedge cutting frequency was less than the requirement for 12 (24%) and three (30%) holdings with options E/OB3, 10 respectively (Table 113).

The cutting of the hedges must not take place between 1st March and 31st August (bird-breeding season) for all hedgerow options. There were only four (4%), five (5%) and three holdings (6%) for options E/OB1, 2, 3 respectively cutting during this period and one holding (3, 4, 11%) for each of options E/OB8, 9, 10 respectively (Table 113).

The most frequent method used for hedge cutting was the flail with over 85% of hedges in options E/OB1, 2, 3, 8, 9 cut by this method (Table 113). A slightly smaller proportion of farmers with E/OB10 used a flail, however the sample size was small.

All the hedgerows managed under each of these options must not be cut in the same year and therefore the interviewees were asked if the hedges were cut rotationally. The 'Non-

applicable' category represents those farmers that do not cut their hedges (Table 113). The numbers of holdings that were not cutting rotationally are three (3%), two (2%), three (6%) and two (6%) for options E/OB 1, 2, 3, 8 respectively (Table 113). All features in E/OB9, 10 were cut in rotation. The most popular method for ensuring rotational cutting was the use of the 'split-farm', but a significant minority were cutting in alternate years and, to a lesser extent, alternate sides. The proportion of holdings cutting part of the farm annually across all the E/OB options ranged from 56% for option E/OB 10 to 70% for option E/OB 3.

There is a requirement under these options to replant gaps in the first two years of the agreement if they constitute more than 10% of the length of the hedgerow. Around half of farmers across all the hedgerow options would replant any gaps with a range from 44 (option E/OB8) to 50% (option E/OB10) of the holdings (Table 113).

Hedges under standard options (E/OB1, 2, 8, 9) must be maintained to a height of no less than 1.5 m, with 2.0 m for enhanced options (E/OB3, 10). The three holdings (3%) with height failures for E/OB1 were the same three holdings (3%) with failures for option E/OB2 (Table 113). However these were different from the seven holdings (14%) with lower than the required minimum height for option E/OB3 (Table 113). The errors for options E/OB1, 2 were one holding using 1 m as the minimum height from the top of a bank instead of 1.5 m, another holding using 4 feet (1.22 m) as the minimum height and one stating 1.2 m was the minimum height. For option E/OB3, three holdings were using 6 feet (1.83 m) as the height requirement and two holdings were using a range (1.5 - 2 m) for both options E/OB1 and E/OB3 and therefore may be correct. The final two holdings specified 1.8 m as the minimum height. Around one quarter of farms indicated that they intended to lay or coppice some of their hedgerows.

Table 113. E(O)B1, 2, 3, 8, 9, and 10 Hedge management: 117 holdings – percent responses.

			Option					
Management	**Response**		**E/OB1**	**E/OB8**	**E/OB2**	**E/OB9**	**E/OB3**	**E/OB10**
		n	***91***	***32***	***101***	***28***	***52***	***10***
Cutting Frequency	**Not done**		2	3	3	4	12	10
	Every year		0	3	2	0	0	0
	Every 2 years		79	75	72	71	17	10
	Every 3 years		14	6	18	18	60	60
	Less frequent		4	13	5	7	12	20
		n	***89***	***31***	***98***	***27***	***46***	***9***
Cutting time (Month)	**August**		2	3	2	4	2	0
	September to October		37	35	42	37	39	22
	November to December		24	29	24	19	20	11
	January to February		22	23	18	30	28	44
	Variable throughout permitted period		12	10	10	11	7	11
	March or includes March		2	0	3	0	4	11
		n	***91***	***32***	***101***	***28***	***52***	***10***
Method	**Flail**		98	91	93	86	85	70
	Rotary Head		0	3	3	7	2	10
	Cutter bar		0	3	1	4	2	10
	None		2	3	3	4	12	10
		n	***91***	***32***	***101***	***28***	***52***	***10***
Are hedges cut rotationally?	**Yes**		95	91	96	96	83	90
	No		3	6	2	0	6	0
	Not applicable		2	3	2	4	12	10
		n	***86***	***29***	***97***	***27***	***43***	***9***
If yes, How	**Split farm**		59	69	63	59	70	56
	Alternate years		26	24	20	30	14	22
	Alternate sides		15	7	15	11	16	22
	Other		0	0	2	0	0	0
		n	***91***	***32***	***101***	***28***	***52***	***10***
Gap replanting	**Yes**		48	44	50	46	44	50
	No		52	56	50	54	56	50
Height of hedges (m)	**Mean**		2.18	2.10	2.20	2.18	2.64	2.95
	S.E.M.		0.08	0.10	0.09	0.10	0.13	0.34
	% below 1.5 m (EB1, 2, 8, 9) or 2 m minimum (EB3, 10)		**3**	0	3	0	14	0
		n	***91***	***32***	***101***	***28***	***52***	***10***
Laying or coppicing	**Yes**		32	28	30	25	27	30
	No		68	72	70	75	73	70

4.5.2 Stone-faced hedge bank, stone wall and earth bank management

For boundary options E/OB4, 5 (stone-faced hedge bank management), EB11 (stone wall management) and E/OB12 and 13 (earth bank management) there is a requirement to repair any damage or gaps that may occur in these features during the course of an agreement. There were no failures for options EB4, 5 but one failure (5%) for option EB11 where the external walls were stockproof, but some internal walls were left with gaps (Table 114). For options E/OB12, 13 there were two holdings (29%), one with each option, that were failing to repair damage.

Table 114. E/OB4, 5, 11, 12 and 13 Stone-faced hedge bank, stone wall and earth bank management: 28 holdings – percent responses.

			Option		
Management	**Response**		**EB4 & 5**	**EB11**	**E/OB12 & 13**
		n	***4***	***20***	***7***
Repair of gaps or damage	**Not done**		0	5	29
	Repaired		100	95	71

4.5.3 Protection of in-field trees on arable land and grassland

In-field trees (options E/OC1, 2) provide habitat for many invertebrates and birds. To comply with the requirements for this option, fallen timber must be left *in situ* within the protected area under the tree canopy. For options E/OC1, 2 only 52% and 56% of the holdings respectively adhered to this rule (Table 115).

Table 115. E/OC1 and 2 In-field tree management: 50 holdings – percent responses.

			Option	
Management	**Response**		**EC1**	**E/OC2**
		n	***19***	***43***
What is done with fallen wood beneath in-field trees?	**Left**		26	47
	Put against tree		26	9
	Field edge		5	2
	Removed		33	28
	Put against tree/removed		5	5
	Left/removed		5	7
	Left/field edge		0	2

4.5.4 Ditch management

These options are intended for ditches forming field boundaries in their own right, options E/OB6 (control of both banks) and E/OB7 (control of one bank). It also includes ditches that are bounded by hedgerows where these would also be managed in (O)ELS: options E/OB8 (control of both banks and both sides of the hedge), E/OB9 (control of one bank and one side of the hedge), E/OB10 (control of both banks with enhanced hedgerow management). For options E/OB6, 8, 9, 10 the vegetation of the ditch bank must not be cut more frequently than once every two years. Only three (7%), three (9%), one (4%) and one holding(s) (10%) for options EOB6, 8, 9, 10 respectively did not comply as they cut their banks every year (Table 116). Of the holdings with E/OB6, 8, 9, 10, cutting was less frequent than stipulated or banks were not cut on 56, 51, 38 and 30% of the holdings respectively (Table 116). The same regulation is not applied to option EOB7 but only two holdings (11%) with this option cut their banks every year. The most common interval was every 2-3 years for options E/OB7 (61%), E/OB9 (59%) and E/OB10 (60%), whereas a more infrequent schedule was used most frequently with option E/OB8 (51%) (Table 116).

The cutting of the bank vegetation must be done in the period from 15th September to 28th February only. For options E/OB6, 7, 8 only 10, 4 and 18% respectively of holdings that cut the banks were cutting outside the permitted period with none from E/OB9, 10 (Table 116). For a further 14, 29, 22 and 27% of holdings that cut ditch banks with options E/OB6, 7, 8, 9 respectively it was unclear whether they were cutting within this period or not (Table 116).

Where necessary to prevent flooding, up to 50% of vegetation in the bottom of the ditch may be cut every year from 15th September to 28th February, though this is not a requirement for option EB7. No holding exceeded this requirement and the most common category was no cutting at all for 62, 61, 52 and 50% of holdings with options E/OB6, 8, 9, 10 (Table 116). For those holdings that do cut the vegetation in the bottom of the ditches, none was definitely done outside the permitted period although for 11% of the holdings with options E/OB6 it was not clear when the ditch vegetation was cut.

Ditches must be cleaned out no more than once during the course of an agreement, though option EB7 is exempt from this restriction. No holdings were cleaning their ditches every year, however 14, 21, 11 and 10% of holdings with options EB6, 8, 9, 10 respectively were doing this every 2-3 years and therefore were not complying with the prescription (Table 116). A further 17, 20, 30 and 10% of holdings with options EB6, 8, 9, 10 respectively, were cleaning their ditches outside the prescribed period (Table 116). A certain proportion, 24, 27, 30, 19 and 20% of holdings for options EB6, 7, 8, 9, 10 respectively, were leaving the spoil on the ditch banks and therefore were likely to be contravening the prescription and cross compliance rules for the disposal of this spoil (Table 116).

Table 116. E/OB6, 7, 8, 9 and 10 Ditch management: 61 holdings – percent responses.

			Option				
Management		**Response**	**E/OB6**	**E/OB7**	**E/OB8**	**E/OB9**	**E/OB10**
Cutting banks	**How often?**	***n***	***43***	***18***	***33***	***27***	***10***
		Not Done	33	6	30	19	20
		Every year	7	11	9	4	10
		Every 2-3 years	37	61	39	59	60
		Less frequently than every 3 years	23	22	21	19	10
	When? (15 Sept to 28 Feb only)	***n***	***29***	***17***	***27***	***22***	***9***
		Within	76	53	59	73	89
		Outside	10	18	4	0	0
		Unsure	14	29	22	27	0
		NA	0	0	15	0	11
Cutting vegetation in ditch bottom	**How often?**	***n***	***42***	***18***	***33***	***27***	***12***
		Never	48	39	55	52	33
		Every year	0	0	3	0	0
		Every 2-3 years	21	28	21	30	33
		More than every 3 years	17	17	15	19	17
		NA (always full)	14	17	6	0	17
	When? (15 Sept to 28 Feb only)	***n***	***18***	***10***	***11***	***13***	***4***
		Within	67	60	91	85	100
		Outside	0	0	0	0	0
		Unsure	11	20	0	8	0
		NA	22	20	9	8	0
Clean out ditches	**How often?**	***n***	***43***	***29***	***33***	***27***	***10***
		Not done	9	7	9	4	0
		Every year	0	0	0	0	0
		Every 2-3 years	14	14	21	11	10
		Every 4 or more years	77	79	70	85	90
	When? (15 Sept to 31 Jan only)	***n***	***36***	***19***	***30***	***27***	***10***
		Within	72	53	73	52	60
		Outside	17	37	20	30	10
		Unsure	8	11	7	19	30
		NA	3	0	0	0	0
	Where do you put the spoil?	***n***	***38***	***15***	***30***	***27***	***10***
		Ditch bank	24	27	30	19	20
		Field edge	21	13	17	22	10
		Field centre	45	47	40	56	70
		Elsewhere	11	13	13	4	0

4.5.5 Management of buffer strips on cultivated or rotational land

Buffer strip management requires the establishment of a grassy strip during the first 12 months of an agreement either by sowing or, ideally by natural regeneration. The strips must be at least 2, 4, 6 or 12 m wide, for options E/OE1, 2, 3, EJ9 respectively. A recent change in the options has created option EE9, a 6 m buffer strip on cultivated or rotational land next to a watercourse. Therefore any option EE3 next to a watercourse should be recorded as EE9 under an agreement put in place since 2010. An assessment was made of the effectiveness of ETIP advice for this transfer of options, from a total of 27 holdings that indicated whether EE3 was adjacent to a watercourse. The same proportion of ETIP, Non-ETIP and unknown holdings recorded EE3 against a watercourse (Table 117), although sample sizes were small. Of those that responded 'Yes', two holdings with ETIP advice, two without ETIP, and one where the advice was unknown, had option EE9 as well.

Table 117. E/OE3 and 9: 6 m buffer strip management on cultivated land – percent responses.

			Level of Advice		
Option	**Management**	**Response**	**ETIP**	**NON ETIP**	**Unknown**
E/OE3 (27 holdings)	**Does the buffer strip run alongside a watercourse?**	***n***	***10***	***10***	***7***
		Yes	70	70	71
		No	30	30	29
E/OE3 (29 holdings) and EE9 (9 holdings)	**Were strips already in place before ELS?**	**n**	***15***	***12***	***11***
		Yes	20	0	27
		No	67	100	73
	If yes, has management changed?	***n***	***3***	***0***	***3***
		Yes	0	0	33
		No	100	0	66

Interviewees were asked whether options E/OE3, 9, were already in place prior to entry into (O)ELS to ascertain if ETIP advice was more likely to result in the creation of new buffer strips. The responses showed that the majority of buffer strips were newly created as shown by 67, 100 and 73% negative responses for ETIP, non-ETIP and unknown advice respectively (Table 117). Those that responded 'Yes' were asked if the management of the buffer strips had changed since joining the scheme and only one holding (33%), where the level of ETIP advice was unknown, responded positively.

Table 118. E/OE1, 2, 3, 9 and EJ9: 2, 4, 6 and 12 m buffer strip management on cultivated land for 50 holdings – percent responses.

		Option				
Management	**Response**	**EE1**	**EE2**	**E/OE3**	**EE9**	**EJ9**
Were strips already in place before ELS?	***n***	***11***	***24***	***29***	***9***	***3***
	Yes	27	13	21	0	67
	No	73	88	79	100	33
If yes, has management changed?	***n***	***3***	***3***	***5***	***0***	***2***
	Yes	33	0	20	0	50
	No	67	100	80	0	50

Interviewees were also asked whether the buffer strips options EE1, 2, 9 and EJ9, were already in place prior to entry into ELS. Once again the majority of buffer strips were created for ELS except for option EJ9 (Table 118). The holdings that responded positively were asked whether their management of the buffer strips had changed since entering ELS but this was not the case for the majority.

Another new option E/OE8 (at least 10 m wide) has been introduced to buffer in-field ponds. Farmers were asked about how they established options E/OE1, 2, 3, 8 and 9. Natural regeneration was most common for EE1 and E/OE8 with 73 and 83% of holdings respectively, whereas sowing was preferred for options E/OE2, 3 (Table 119). The holdings that were establishing buffer strips by sowing were asked if they were adding any wildflower seed. Of these, one (33%), five (36%), eight (35%) and one holding(s) (100%) of options E/OE1, 2, 3, 8 were adding this type of seed (Table 119). They were also asked whether soil compaction was removed prior to sowing. Overall two thirds of farmers indicated that they removed compaction; 100, 71, 52, 100 and 80% of options E/OE1, 2, 3, 8, 9 respectively (Table 119).

Buffer strips under options E/OE1, 2, 3, 8, 9 were cut on 82, 88, 84, 50 and 78% of holdings respectively. However, for options E/OE3, 9 the 3 m next to the crop should be cut annually according to the prescription (Table 119). The other buffer strip options and the other 3 m of options E/OE3, 9 may be cut no more than once every two years. 44, 48 and 67% of the options E/OE1, 2, 8 were cut more frequently than this requirement (Table 119). It was difficult to assess accurately the cutting regime for options E/OE3, 9 due to need to cut the areas at different frequencies.

There is no prescription on the time of cutting for options EE1, 2 or the 3 m next to the hedgerow for options E/OE3, 9. However the 3 m next to the crop for the options E/OE3, 9 must be cut after 15th July while option EE8 must not be cut between 1st March and 31st August as this is the bird-breeding season. These bird breeding season dates were used to assess all options. None of the holdings with option E/OE8 and only 22, 33, 12 and 29% of holdings with options E/OE1, 2, 3, 9 respectively were cut during this period (Table 119). Also 12 and 14% of holdings with options E/OE3, 9 respectively were cut before 15th July and therefore were not complying with the prescription for the option.

Those holdings that were cutting arable buffer strips were asked whether they removed the cuttings. This is environmentally beneficial because it reduces the fertility of the buffer strip

but is not a requirement under the prescriptions. Only 22, 10, 8, 33% of holdings with options E/OE1, 2, 3, 8 respectively and none of holdings with option EE9 were removing the cuttings (Table 119).

Herbicides can be used for options E/OE1, 2, 3 however they should be applied only to spot-treat or weed-wipe for the control of injurious weeds or invasive non-natives. Only 9, 13 and 13% of holdings with options E/OE1, 2, 3 made herbicide applications (Table 120). These were all made using a knapsack sprayer generally using selective compounds for broad-leaved weeds and the targets were mostly injurious weeds (Table 120). However, herbicides were also used against cow parsley on two holdings, which therefore did not comply with the prescription.

Buffer strips have an important role in resource protection and farmers with these options were asked whether they had been positioned to reduce soil erosion. 46, 46 and 65% of those with options E/OB1, 2, 3 respectively responded positively to this question (Table 120).

Table 119. E/OE1, 2, 3, 8 and 9: 2, 4, 6 and 10 m buffer strip management on cultivated land for 54 holdings – percent responses.

			Option				
			EE1	EE2	E/OE3	E/OE8	EE9
		Width (m)	2	4	6	10	6
Management		**Response**					
Method of establishment		***n***	***11***	***24***	***31***	***6***	***9***
		Natural regeneration (NR)	73	42	26	83	44
		Sown (SO)	9	50	61	17	44
		NR & SO	18	8	13	0	11
If sown		***n***	***3***	***14***	***23***	***1***	***5***
	Was there wildflower seed in mix?	**Yes**	33	36	35	100	0
		No	67	64	65	0	100
	Was compaction removed before sowing?	**Yes**	100	71	52	100	80
		No	0	29	48	0	20
Is the area cut?		***n***	***11***	***24***	***31***	***6***	***9***
		Yes	82	88	84	50	78
		No	18	13	16	50	22
If yes		***n***	***9***	***21***	***26***	***3***	***7***
	How often per year?	**Permitted**	56	52	NA	33	NA
		More frequent	44	48	NA	67	NA
	Time of year	**Outside BBS***	67	48	54	33	43
		Inside BBS*	22	33	12	0	29
		During prescription	NA	NA	12	0	14
	Amount of area cut	**All**	44	24	27	33	29
		Part	56	71	69	67	57
	Cuttings removed?	**Yes**	22	10	8	33	0
		No	67	76	88	67	86

*BBS – Bird-breeding season - 1st March to 31st August

Table 120. E/OE1, 2 and 3: 2, 4 and 6 m buffer strip management on cultivated land for 48 holdings – percent responses.

		Option		
		EE1	EE2	E/OE3
	Width (m)	2	4	6
Management	**Response**			
Are herbicides applied?	***n***	***11***	***24***	***31***
	Yes	9	13	13
	No	91	88	87
Type of herbicide used	***n***	***1***	***3***	***4***
	Selective – Broad - leaved	0	33	75
	Unselective	0	33	0
	Unknown	100	33	25
Applicator	**Knapsack**	100	100	100
Target weeds	**Dock**	33	33	50
	Thistle	33	33	75
	Ragwort	0	0	25
	Cow parsley	33	0	25
Positioned to reduce soil erosion?	**n**	***11***	***24***	***31***
	Yes	45	46	65
	No	55	54	35

4.5.6 Buffer strip management on intensive or organic grassland

The buffer strips on intensive or organic grassland, options E/OE4, 5, 6, 7, 10, provide valuable habitat for small mammals and resource protection. On fields that will be mown there must be an uncut 2, 4, 6 or 10 m margin around the edge of the field/pond depending on the option. Interviewees were asked how the management of the buffer strips was different to the regime for the rest of the field. No fertilisers were used by 60% of farmers with options E/OE4, 5, 6, 7, 10 (Table 121). Therefore 40% of options were not complying with the prescriptions which allow no fertiliser Three farmers indicated that management of the buffer strip was the same as the field itself. One of these was organic, however the remaining two could not be complying with the prescription because they were either receiving fertiliser (not allowed under the prescription) or were adjacent to low input grassland. Buffer strips under these options must be adjacent to improved grassland receiving more than 100 kg/ha N annually.

Of the seven holdings with option E/OE6, six had features adjacent to watercourses which should have been entered as the new EE10 option.

Herbicides were used on 33 and 29% of farms with options E/OE4, 5 and options E/OE6, 7, 10 respectively (Table 122). A knapsack sprayer was used for 100 and 83% of the applications to options E/OE4, 5 and options E/OE6, 7, 10 respectively and a ground sprayer by 17% of those with options E/OE6, 7, 10 (Table 122). The herbicides used were mainly selective, as they were

effective against broad-leaved weeds only. Only one farmer with options E/OE6, 7, 10 used herbicides that were non-selective (Table 122). These compounds were generally applied to control injurious weeds, however on two options herbicides were applied to control nettles and two to control hogweed. (Table 122). Therefore these applications did not comply with the prescription, although all applications including these were correctly applied as spot-treatments.

Despite the fact that the prescription allows cutting only to control woody growth, 33% of options were topped, usually to control weeds and 15% were cut for hay/silage. These buffer strips may also be grazed and this was the case for 92 and 81% of the holdings with options E/OE4, 5 and options E/OE6, 7, 10 respectively (Table 122).

Table 121. 'Differences in management' between E/OE4, 5, 6, 7 and 10 buffer strips and adjacent intensive grassland: 24 holdings – percent responses.

		Option	
		E/OE4 and 5	E/OE6, 7 and 10
	Width (m)	2 and 4	6 and 10
Management	**Response**		
	n	***10***	***20***
How is management different from rest of field?	**No fertiliser**	60	60
	No herbicides	20	35
	No harrowing	0	5
	No topping or cutting	20	15
	No cutting for silage	0	5
	Fenced to exclude stock, not mown/sprayed/fertilised	10	25
	Not tilled with rest of temporary grass field	10	0
	No difference	20	5

4.5.7 Permanent grassland with low and very low inputs

Permanent grassland managed under options E/OK2 and 3 that is maintained with low and very low inputs of fertiliser and sprays will support a greater diversity of plants and wildlife. Herbicide use is only allowed as spot treatment or weed wipe to control injurious weeds, invasive non-natives and bracken. Herbicides were used on 56 and 36% of holdings with E/OK2, 3 respectively (Table 122). Of these, 75 and 81% of holdings with options E/OK2, 3 respectively used a knapsack sprayer for the application and 92 and 100% of holdings with options E/OK2, 3 respectively applied the herbicides as spot treatments (Table 122). The majority of applications (75 and 76% of holdings with options E/OK2, 3 respectively) used compounds that are active against broad-leaved plants alone. Their targets were mainly the injurious weeds; however 44 and 10% of holdings that were applying herbicides with options E/OK2, 3 respectively mentioned nettles as a target (Table 122).

Topping is only allowed in patches to control injurious weeds, invasive non-natives, bracken and areas dominated by rushes.. Of the holdings with E/OK2, 3, 60 and 54% respectively reported that

they topped, although the main reason given by 82 and 79% of the holdings was to control injurious weeds (Table 122).

Hay/silage production is allowed for both options. This was done most frequently every two years for 40 and 29% of holdings with options E/OK2, 3 but most (55 and 63% of holdings with options E/OK2, 3) did not cut for hay/silage (Table 122). The fields are primarily used for grazing with 98 and 88% of holdings with options E/OK2, 3 respectively using them in this way.

The fields under the options E/OK2, 3 may be fertilised however there are restrictions on quantity and type for both options. For option EK2 no more than 50 kg/ha nitrogen per year should be applied as inorganic fertiliser. Where animal manures are applied, either alone or in addition to inorganic fertilisers, the total rate of nitrogen must not exceed 100 kg/ha nitrogen per year. Only three holdings (5%) applied more than the maximum allowed for inorganic fertiliser and only one further holding (2%) applied more than the maximum allowed when both inorganic and organic fertilisers are applied (Table 123).

For option EK3 only organic fertiliser may be used and up to 12.5 tonnes/ha of farm yard manure (FYM) may be applied each year but only where the grassland is regularly cut. Only 16% of the holdings used organic manure and none exceeded the maximum allowance, but there was one holding applying FYM that was not cutting (Table 123). Moreover two holdings (4%) applied inorganic nitrogen fertiliser and therefore do not comply with the prescriptions for the option (Table 123).

Rolling and harrowing are two techniques used to improve sward quality. These must not be done from 1st April to 30th June. Rolling was done on 43 and 29% of holdings with the options E/OK2, 3 respectively and 43 and 26% of holdings with the options E/OK2, 3 respectively were harrowed (Table 123). Of those that did roll or harrow, 38% were rolling and 35% harrowing EK2 during the prohibited period, whilst for those with option EK3, the results were 18 and 33% respectively. This represented 11% of options under EK2, 3.

Supplementary feeding is allowed for option EK2 but it is not permitted for option EK3. Only 35% of holdings with option EK2 used supplementary feeding, however9% (five holdings) of those with EK3 were supplementary feeding and therefore failing the prescription requirements (Table 123). For option EK2 supplementary feeding is prohibited on or next to archaeological features. However, 32% of holdings with this option used this feeding method where these features were present (Table 123).

Table 122. E/OE4, 5, 6, 7 and 10; E/OK2 and 3 Sward management of buffer strips on intensive grassland and of low input grassland: E/OE4, 5, 6, 7 and 10 (27 holdings); E/OK2 and 3 (101 holdings) – percent responses.

			Option			
			E/OE4/5	E/OE6/7/10	E/OK2	E/OK3
Management		**Response**				
		n	***12***	***21***	***64***	***59***
Are herbicides applied?		**Yes**	33	29	56	36
		No	67	71	44	64
		n	***4***	***6***	***36***	***21***
If yes	**Type of applicator**	**Knapsack**	100	83	75	81
		Weed wiper	0	0	11	5
		Ground sprayer	0	17	8	5
		Lance	0	0	6	5
	Herbicide type	**Non-selective**	0	17	14	10
		Broad-leaved weeds	75	83	75	76
		Unknown	25	0	11	14
	Target	**Thistles**	75	50	92	76
		Nettles	25	17	44	10
		Hogweed	0	33	0	0
		Docks	0	17	31	33
		Ragwort	0	0	11	5
		Rushes	0	0	6	5
	How applied?	**Spot**	100	100	92	100
		Overall	0	0	6	0
		Both	0	0	3	0
		n	***12***	***21***	***64***	***59***
Topping of field/buffer strip	**Frequency**	**Too frequent**	33	20	60	54
		Permitted	8	10	0	0
		No cutting	58	70	40	46
	Why do you top?	**Remove flower heads**	33	0	0	0
		Weed control	67	100	82	79
		Excess growth	0	0	16	15
		Encourage grass growth	0	0	2	0
		EA would flail it anyway	0	0	0	3
How often is option cut for hay/silage?		**Once per year**	0	0	0	3
		Once every 2 years	25	10	40	29
		Once every 3 years	0	0	3	7
		Once every 5 years	0	0	0	2
		Never	75	86	55	63
Is buffer strip/field grazed?		**Yes**	92	81	98	88
		No	8	19	2	12

Table 123. E/OK2 and 3 Sward management of low input grassland: 99 holdings – percent responses.

		Option	
Management	**Response**	**E/OK2**	**E/OK3**
	n	***62***	***58***
Rate of inorganic fertiliser (kg/ha of N)	**None**	48	97
	1-50 kg/ha	47	2
	51-100 kg/ha	3	0
	>100 kg/ha	2	0
	Range 0-150	0	2
	n	***62***	***57***
Rate of organic manure (t/ha)	**None**	74	84
	Unknown	16	7
	0-12.5 t/ha	8	9
	>12.5 t/ha	2	0
	n	***16***	***9***
Type of organic manure	**Cow manure**	69	67
	Pig slurry	0	11
	Dairy slurry	13	11
	Horse manure	6	11
	Sheep manure	6	0
	Goat slurry	6	0
	n	***61***	***59***
Do you roll or harrow/both?	**Roll**	15	15
	Harrow	15	12
	Both	28	14
	None	43	59
	n	***26***	***17***
If yes, when do you roll?	**Permitted**	62	82
	Not allowed	38	18
	n	***26***	***15***
If yes, when do you harrow?	**Permitted**	65	67
	Not allowed	35	33
	n	***62***	***58***
Is supplementary feed used?	**Yes**	35	9
	No	65	88
	Unknown	0	3
	n	***59***	***53***
Is supplementary feed or plastic-wrapped forage used where there are archaeological features?	**Yes**	32	6
	No	68	94

4.5.8 Management of field corners, wild bird seed mixtures and nectar flower mixtures

The management of field corners (option E/OF1) uses the awkward and/or less productive areas of arable fields to provide grassy areas that will enhance biodiversity and/or resource protection. For this option establishment is either by sowing or, ideally, by natural generation. Sixty percent of holdings with this option used the latter method for establishment (Table 124). The holdings that sowed their options were asked if they included wild flower seed and 52% responded positively. Additionally 57% had removed compaction before preparing the seedbed (Table 124).

Table 124. E/OF1 Management of field corners: 45 holdings – percent responses.

Management		Response	E/OF1
		n	***45***
Means of establishment: Natural regeneration (NR) or sowing (S)		**NR**	49
		S	40
		NR and S	11
		n	***23***
If sown (n=23)	**Is wild flower seed added to the mix?**	**Yes**	52
		No	48
	Is compaction removed before preparing seedbed?	**Yes**	57
		No	43

Wild bird seed mixtures (option E/OF2) have the potential to provide an important food resource for farmland birds in winter and early spring. The aim is to grow a range of plants that produce small seeds for birds from annual and/or biennial mixes as well as providing a source of invertebrates for birds. All the holdings interviewed established this option in the spring and 92% were sown as a mixture (Table 125). At least 50% of the seed sown was treated to aid establishment and no insecticides were sprayed on this option. Permitted fertilisers were only used by eight holdings (33%), mainly organic (six holdings), and most of the latter used less than 5 t/ha (Table 125).

The seed mixture is the most essential aspect of option E/OF2 and there are a range of suitable plants from which a mixture can be made. The interviewees' responses showed that 25% of the holdings were using fewer small seed-bearing species in their mixtures than the required three (Table 126). Additionally, seven holdings included species that are not allowed (maize, sorghum and sweet clover). Five of these had correct mixtures otherwise. It is important to re-sow to maintain seed production however 13% of the holdings left their mixtures for more than two years. Only 21% of the holdings relocated their areas around the farm, a practise that is encouraged to help avoid the build-up of weeds or soil-borne disease (Table 126).

Table 125. EF2 Management of wild bird seed mixtures: 24 holdings – percent responses.

Management	Response	EF2
	n	***24***
Time of sowing	**Autumn**	0
	Spring	100
How sown?	**Separate drills**	8
	mixture	92
Treated seed	**Yes**	50
	No	38
	Unsure	13
Are insecticides used?	**Yes**	0
	No	100
Product used		None
Target insect		NA
Fertiliser applied	**Inorganic**	8
	Organic	25
	None	67
	n	***6***
Type of manure	**Cow**	33
	Sheep	17
	Goat	17
	Poultry	33
Rate applied (t/ha/y)	**<5**	83
	20	17

The option (E/OF4) is designed to provide an area of flowering plants that will boost the availability of pollen and nectar for a range of invertebrates that require these resources. For this option a mixture of at least four nectar-rich plants must be sown and five of the holdings interviewed (36%) were sowing fewer species than this target (Table 126). Mixtures should be resown as necessary to maintain a sustained nectar supply, typically every three years. Only two holdings (14%) were resowing less frequently (Table 126). Only two holdings (14%) were taking advantage of the fact that this option may be rotated around the farm (Table 126).

Table 126. E/OF2 and 4 Management of wild bird seed mixtures and areas of nectar flower mixes: 24 holdings for EF2 and 14 holdings for E/OF4 – percent responses.

			Option	
Management	**Response**		**EF2**	**E/OF4**
		n	***24***	***14***
Sown Mixture	**Less than required**		25	36
	Meets requirements		67	21
	Unknown		8	14
	Unsure		0	29
	Incorrect additions		29	0
Frequency of resowing	**Meets requirements**		79	71
	Left for too long		13	14
	Unknown		8	14
Are locations rotated?	**Yes**		21	14
	No		71	79
	Unknown		8	7

Cutting is a possible management tool for all sown patches. For option E/OF1, regular cutting in the first 12-24 months is suggested to control annual weeds and to encourage grass tillering but after this period cutting should only occur no more than once every 5 years to allow the development of a tussocky grass structure. Most farms (76%) were cutting their field margins, however 62% of these were cutting more frequently than permitted (Table 127). Moreover 44% of these holdings were also cutting during the prohibited period between 1st March and 31st August. Most of the holdings (56%) were only cutting part of the option and most of them did not remove the cuttings (85%) (Table 127).

Regular cutting is used to ensure successful establishment of the sown species for option E/OF4. It is also used to stimulate late flowering to meet the peak demand from bees with half the area cut between mid-June and end of 1st week July to ensure this. The whole area should then be cut between 15th September and 31st October and the cuttings removed or shredded. All holdings reported that they cut this option, however 82% did this too infrequently and 35% cut outside the prescribed cutting time (Table 127). 53% of the holdings cut the whole of the option and only 35% of the holdings removed the cuttings from the option (Table 127). No E/OF4 features were grazed.

Table 127. E/OF1 and 4 Management of field corners and areas of nectar flower mixes: 45 holdings for E/OF1 and 17 holdings for E/OF4 – percent responses.

			Option	
Management	**Response**		**E/OF1**	**E/OF4**
		n	**45**	**17**
Is the option area cut?	**Yes**		76	100
	No		24	0
		n	**34**	**17**
How often?	**Too frequent**		62	0
	Meets requirements		38	18
	Infrequent		0	82
When is it cut?	**Not complying**		44	35
	Meets requirements		56	35
	Unsure		0	29
How much of area is cut?	**All**		41	53
	Part		56	47
	Unknown		3	0
Are cuttings removed?	**Yes**		12	35
	No		85	65
	Unknown		3	0

Weed control may be a problem for all sown areas and holdings with options E/OF1, 2, 4 were asked if these herbicides were applied. Only eight (18%), six (25%) and three holdings (18%) with options E/OF1, 2, 4 respectively applied herbicides (Table 128). Compounds active selectively against broad-leaved weeds were used by six (75%) and two (67%) of the holdings with E/OF1, 4, and non-selective compounds by six holdings (67%) with E/OF2 (Table 128). These applications were mostly done with knapsack sprayers (88, 50 and 100% of option E/OF1, 2, 4 respectively) and the targets were mainly the permitted injurious weeds though on three holdings herbicides were used to control common nettle (Table 128).

Table 128. E/OF1, 2 and 4 Management of field corners, wild bird seed mixtures and areas of nectar flower mixes: 45 holdings for E/OF1, 24 holdings for EF2 and 17 holdings for E/OF4 – percent responses.

			Option		
Management	**Response**		**E/OF1**	**EF2**	**E/OF4**
		n	***45***	***24***	***17***
Are herbicides applied?	**Yes**		18	25	18
	No		82	75	82
		n	***8***	***6***	***3***
Type of herbicide used	**Non-selective**		25	67	0
	Broadleaf		75	17	67
	Unknown		0	17	33
Type of applicator	**Knapsack**		88	50	100
	Lance		13	0	0
	Ground sprayer		0	50	0
Target	**Thistles**		75	83	100
	Ragwort		25	0	33
	Nettles		25	17	0
	Docks		0	0	33
	Groundsel		0	17	0
	Blackgrass		0	17	0
	Weeds		13	0	0
	Broad-leaved weeds		0	17	0

4.5.9 Management of overwintered stubble

This option (E/OF6) provides an important winter food source for seed-eating birds, a habitat for brown hare and the following spring-sown crop provides breeding sites for ground-nesting birds. To comply with this option the straw must be baled, which was done by 81% of the holdings questioned or chopped and spread after harvest, done by 19% of the holdings (Table 129). A light cultivation may be made before the end of September if the stubble was clean, and this was done straight after harvest on five holdings (16%) (Table 129).

On sloping fields it is important to subsoil severely compacted areas such as tramlines. Tramlines were subsoiled by 29% of the holdings with this option. Herbicides for pre-harvest desiccation or for post-harvest weed control are not allowed however six holdings (19%) used the former and one holding (3%) used both types of compounds (Table 129). From 15th February, the stubble can be returned to cultivation. No farms destroyed the stubble too early; most cultivated in the second half of February (48%) with a further 36% in March (Table 129).

Table 129. E/OF6 Management of overwintered stubbles: 31 holdings – percent responses.

Management	Response	E/OF6
	n	***31***
What happens to the straw?	**Removed**	81
	Chopped and spread	19
	Left	0
Cultivation of stubble after harvest	**Yes**	16
	No	84
	n	***5***
If yes, what proportion (%)?	**5-10**	40
	60	20
	100	40
How are they cultivated?	**Light rake**	60
	Unspecified	40
When is it done?	**Straight after the harvest**	100
	n	***31***
Are tramlines subsoiled?	**Yes**	29
	No	71
Are herbicides applied?	**Pre-harvest desiccants**	19
	Post-harvest	0
	Both	3
	No	77
Date when stubble is ploughed?	**15th – end of February**	48
	March	36
	April	7
	Depends on crop	3
	July	3
	Unknown	3

4.5.10 Maintenance of weatherproof traditional farm buildings

Traditional farm buildings are eligible for E/OD1 if they were constructed before 1940 and continue to have a use associated with agriculture. The annual active maintenance of these buildings prevents the onset of serious structural problems. Holdings with this option were asked about the type and level of repair needed for the maintenance of these buildings. Roof repairs were the most common task undertaken by the majority of holdings with 51% repairing these alone and a further 31% repairing both roofs and walls.

Table 130. E/OD1 Maintenance of weatherproof traditional farm buildings: 43 holdings – percent responses.

Management	**E/OD1**
n	***43***
Roof repairs - mainly retiling but sometimes as extensive as re-lathing	51
Walls – re-pointing etc	7
Roof and wall repairs	30
Nothing yet but monitoring	12

4.5.11 Management of archaeological features on grassland

Well-managed permanent pasture is the best management option to protect archaeological features. The holdings with E/OD5 were asked what management had been done for this option. One holding (14%) was not doing any cultivation, which suggests that this was an arable reversion site and eight holdings (56%) mentioned grazing and therefore were more likely to be maintaining a continuous grass sward (Table 131). Two holdings (28%) mentioned weed control, by topping and herbicides, which is a requirement for compliance. These represented changes from previous management practises for seven (50%) of the holdings questioned with the option (Table 131). Two holdings had reduced fertiliser inputs and another two had removed cattle thereby lessening the opportunity for bare patches of soil to develop. However two holdings (13%) with this option did use supplementary feeders or plastic wrapped forage so may have been in contravention of the rule for this type of feeding on, or next to an archaeological feature (Table 131).

Table 131. E/OD5 Management of archaeological features on grassland: 15 holdings – percent responses.

Management	Response	E/OD5
	n	***14***
What management has been done for this option?	**Top thistles and trap moles**	7
	Herbicide for nettles	7
	No cultivation	7
	None	14
	Grazed by sheep	28
	Grazed by sheep and cattle	21
	Grazed by cattle	7
	No fertiliser	7
Is this different from previous management?	**Yes**	50
	No	50
If Yes, how?	**Herbicide**	14
	Used to plough occasionally	14
	Used to have cattle with feeders, now sheep	14
	Used to use maximum fertiliser input	14
	Less fertiliser as low input grassland	14
	No cattle now	14
	Unknown	14
Are supplementary feeders or plastic wrapped forage used?	***n***	***15***
	Yes	13
	No	87

4.6 Comparisons of field attributes for features between ELS options, ELS-farm controls and non-participant farm controls

A range of measureable attributes were assessed in the field to assess feature condition and results for non-priority options are presented here. For a subset of features, field samples included features on ES farms outside agreement and similar features on non-participant farms. Where possible, data were analysed to compare features in and out of agreement on the same farm and between features in ES management and those on non-participant farms.

Hedges and grasslands were recorded as controls, where available, on ELS farms, and hedges, ditches, in-field trees, buffers and grasslands were recorded as controls on non-participant farms (section 2.2.4). These were the only options where sufficient numbers were available for meaningful comparisons. Both sets of control data have been analysed in comparison with data from similar features in ELS.

For attributes with continuous data, analysis was carried out at the farm level so that the pairing (blocking) of controls and features within farm was accounted for. For continuous variables, REML analysis was carried out to test for a difference between ELS features and controls. The data showed a skewed distribution so they were logged before analysis. The original means and predicted means (back-transformed), with F probability as a measure of significance, are tabulated below. Statistically significant results are plotted as predicted means with 95% confidence limits; means separating groups, as tested by Fisher's unprotected least significant differences, are indicated using letters.

Compositional data (i.e. percent cover data for groups of species that sum to 100%) were analysed by multivariate analysis of variance after log transformation. Because individual attributes were not independent, five attributes were analysed representing the proportion of five groups as a ratio of the sixth group. Thus response variables were: log(% cover coarse grass/% cover fine grass), log(% cover woody species/% cover fine grass), log(% cover forbs/% cover fine grass), log(% cover bare ground/% cover fine grass), log(% cover dead vegetation/% cover fine grass). Note that the output of this analysis is independent of the choice of the category to use as denominator in the ratios.

Presence/absence attributes were analysed as the number of positive responses per farm. For example, the presence of saplings in a hedge was recorded as presence/absence for each hedge replicate (up to three per hedge option per farm); each farm was then scored as the number of hedge replicates with saplings present out of the total number of replicates on the farm. Logistic regression analysis of the data then provided an F probability, predicted means and 95% confidence intervals (back-transformed).

Categorical data were analysed to compare the distributions of attributes between options and controls. For instance, in-field trees were allocated to young, mature and veteran categories; the distribution of these age-groups was analysed using a chi-square test for association, treating each feature independently rather than summarising by farm.

Data for variables that were not subjected to statistical analysis are presented in Appendix 2.

4.6.1 Hedges: comparison with in-farm controls

ELS hedges were compared with controls on the same farms for a variety of attributes; the results are presented in Table 132. The variables which showed a statistically-significant difference were hedge height (EB3), percentage gaps (EB2 & EB3), width of uncultivated strip (EB2) and cover of insect-pollinated plants in the uncultivated strip (EB2).

There was little difference in hedge height between hedges managed under options EB1 and EB2 and their in-farm controls but hedges managed under option EB3 were on average significantly taller than control hedges on the same farms (Figure 45).

For each ELS option, the ELS hedges had a lower average percentage of gaps than the equivalent in-farm controls; this was statistically significant for EB2 and EB3 (Figure 46).

Uncultivated strips adjacent to ELS hedges were generally wider than for the equivalent in-farm controls, although this was statistically significant only for the EB2 hedges (Figure 47).

There was a slightly greater cover of insect-pollinated plants on uncultivated strips next to ELS hedges compared with in-farm controls, although this was statistically significant only for the EB2 hedges (Figure 48).

These results suggest that farmers either selected their taller hedges with fewer gaps and wider, more diverse uncultivated strips to put into ELS and/or that they have subsequently managed their ELS hedges differently to increase height, reduce gaps and maintain wider uncultivated strips richer in species next to ELS hedges. The latter is more likely to occur where hedges were already managed under a previous agreement.

Table 132. Comparison of ELS hedge options and in-farm controls. Where tests are statistically significant, F probabilities are in bold and shaded.

Hedge Attributes		OBSERVED MEASUREMENTS ELS SAMPLE N	FARM MEAN	SEM	CONTROL N	FARM MEAN	SEM	*STATS OUTPUT (back-transformed) ELS mean*	*control mean*	*F prob*
Saplings left to grow?	EB1	20	10.00	5.97	19	10.53	6.27	*11.54*	*11.76*	*0.978*
	EB2	24	16.67	6.95	24	12.50	6.29	*16.39*	*11.48*	*0.541*
	EB3	18	21.30	8.28	18	17.59	7.44	*19.15*	*18.37*	*0.944*
Hedge height (m)	EB1	20	3.70	0.34	20	3.43	0.29	*3.39*	*3.09*	*0.143*
	EB2	24	3.87	0.28	24	3.94	0.32	*3.57*	*3.54*	*0.877*
	EB3	18	4.70	0.56	18	3.95	0.72	*3.94*	*3.31*	***0.036***
Canopy height (m)	EB1	20	0.75	0.10	20	0.56	0.05	*0.60*	*0.49*	*0.056*
	EB2	24	0.59	0.05	24	0.65	0.07	*0.50*	*0.52*	*0.793*
	EB3	18	0.67	0.09	18	0.58	0.06	*0.51*	*0.47*	*0.593*
Hedge width (m)	EB1	20	3.15	0.23	20	2.79	0.22	*2.76*	*2.60*	*0.518*
	EB2	24	3.11	0.191	24	3.18	0.255	*2.95*	*2.89*	*0.672*
	EB3	18	3.58	0.35	18	2.85	0.25	*3.09*	*2.72*	*0.053*
Percentage gaps	EB1	19	4.97[11]	1.90	20	5.31	1.51	*1.39*	*1.97*	*0.320*
	EB2	24	0.86	0.30	24	4.41	6.20	*0.34*	*1.39*	***0.001***
	EB3	17	1.98	0.50	18	7.82	2.25	*1.07*	*2.25*	***0.048***
5 m gaps present?	EB1	19	17.54	5.91	20	16.67	6.17	*20.41*	*19.23*	*0.900*
	EB2	24	9.02	3.32	24	21.53	5.98	*9.84*	*19.67*	*0.132*
	EB3	17	11.76	4.90	18	27.78	8.20	*13.64*	*26.53*	*0.196*
Number of species	EB1	19	3.73	0.36	19	3.78	0.34	*3.20*	*3.44*	*0.107*
	EB2	23	4.28	0.25	23	4.30	0.26	*4.01*	*4.10*	*0.670*
	EB3	18	3.70	0.33	18	3.61	0.32	*3.40*	*3.25*	*0.540*
Percentage shrubs with flowers/fruits	EB1	20	19.14	6.66	20	21.36	5.04	*5.30*	*6.49*	*0.401*
	EB2	24	11.52	2.26	24	17.93	4.12	*5.22*	*7.11*	*0.139*
	EB3	18	24.69	5.68	18	26.31	5.63	*9.96*	*9.67*	*0.898*
Native boundary trees?	EB1	18	48.13	9.33	18	50.03	8.09	*52.08*	*47.92*	*0.762*
	EB2	21	65.05	9.06	23	56.61	7.62	*63.64*	*56.90*	*0.601*
	EB3	17	48.94	10.36	17	57.82	9.29	*52.27*	*54.35*	*0.896*
Width uncultivated strip (m)	EB1	11	3.69	0.62	11	3.47	0.64	*3.07*	*2.99*	*0.773*
	EB2	15	4.17	0.67	13	3.58	0.61	*3.50*	*2.88*	***0.017***
	EB3	11	3.91	0.65	11	3.36	0.56	*3.21*	*2.92*	*0.417*
Width perennial vegetation (m)	EB1	12	2.38	0.57	12	2.05	0.57	*1.56*	*1.5*	*0.843*
	EB2	17	2.46	0.58	15	2.40	0.54	*1.67*	*1.53*	*0.393*
	EB3	12	2.23	0.45	12	1.89	0.49	*1.45*	*1.42*	*0.930*
Cover injurious species (%)	EB1	20	4.68	0.86	20	3.60	0.59	*2.69*	*2.07*	*0.281*
	EB2	24	2.87	0.46	24	3.61	0.83	*1.87*	*2.25*	*0.334*
	EB3	18	3.32	0.69	18	3.74	1.11	*2.33*	*1.74*	*0.238*
Cover nitrophilous species (%)	EB1	20	11.53	2.64	20	10.96	2.23	*5.87*	*6.32*	*0.734*
	EB2	24	8.04	1.85	24	11.79	1.86	*4.87*	*6.85*	*0.062*
	EB3	18	9.87	3.11	18	10.52	2.73	*3.91*	*5.43*	*0.180*
Cover bramble (%)	EB1	20	2.03	0.68	20	1.48	0.40	*1.02*	*0.72*	*0.183*
	EB2	24	2.56	0.38	24	2.41	0.43	*1.83*	*1.41*	*0.189*
	EB3	18	3.50	1.02	18	2.82	0.82	*1.76*	*1.45*	*0.399*
Cover insect-pollinated species (%)	EB1	19	12.04	2.20	19	7.00	1.13	*6.11*	*4.70*	*0.158*
	EB2	22	11.89	1.62	22	8.40	1.17	*8.38*	*5.64*	***0.022***
	EB3	18	10.85	2.24	18	10.24	2.15	*6.62*	*5.37*	*0.263*

[11] This mean was skewed by a value of 60%, probably representing a newly planted hedge.

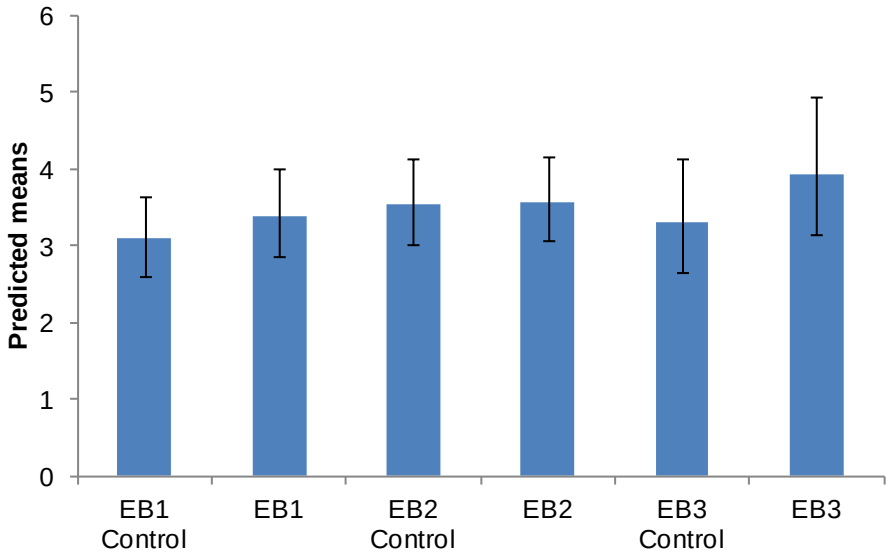


Figure 45. Hedge heights (m) for ELS hedges and in-farm controls.
(EB3 is significantly different from control)

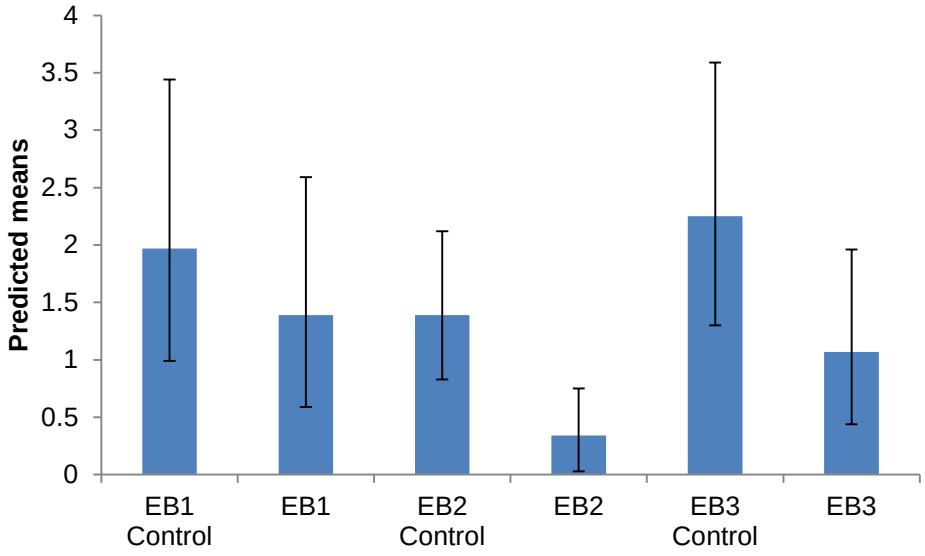


Figure 46. Percentage hedge gaps for ELS hedges and in-farm controls.
(EB2 and EB3 are significantly different from controls)

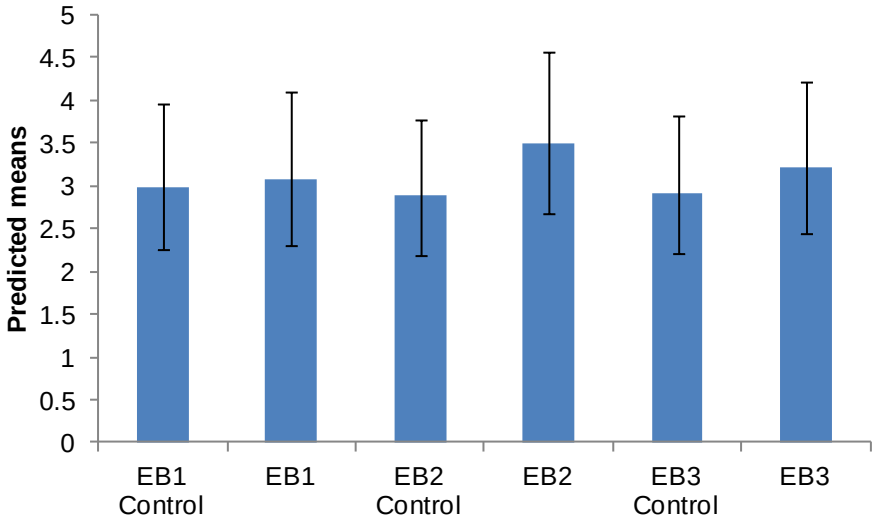


Figure 47. The widths of uncultivated strips (m) next to ELS hedges and in-farm control hedges. (EB2 is significantly different from controls)

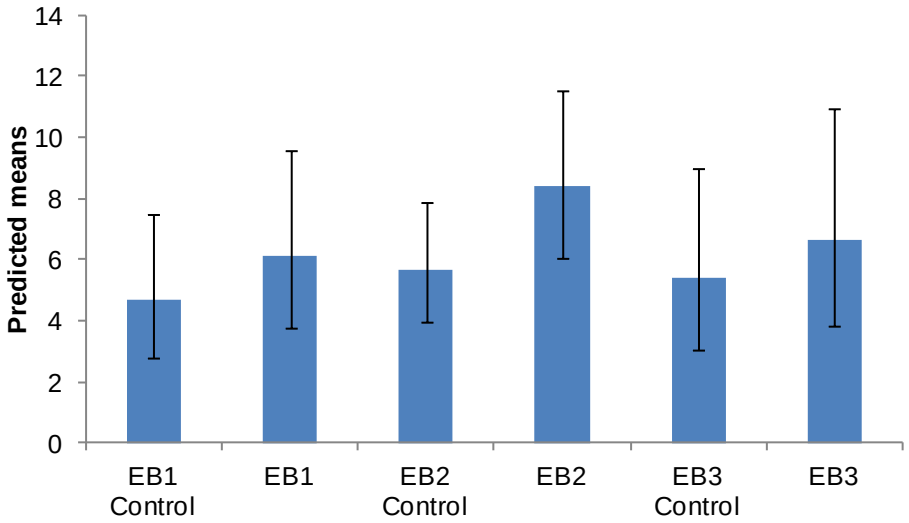


Figure 48. Percent cover of insect-pollinated plants in uncultivated strips next to ELS hedges and in-farm control hedges. (EB2 is significantly different from controls)

In addition to the variables in Table 132, the vegetation composition of the strip adjacent to the hedges was recorded in terms of different plant groups: firstly, annuals and perennials (adding to 100% cover) and secondly, fine grasses, coarse grasses, forbs, woody species, bare ground and dead vegetation (adding to 100% cover). The means and standard errors for these categories are given in Table 133. Since these are compositional data (sum to 100%), they were analysed by multivariate analysis of variance after suitable transformation. None of these results showed a statistically significant difference between hedge categories for either the annuals/perennials or the other vegetation categories.

Table 133. Mean percentage cover for plant categories in uncultivated strips next to ELS and in-farm control hedges.

Vegetation Categories		OBSERVED MEASUREMENTS					
		ELS SAMPLE			CONTROL		
		N	MEAN	SEM	N	MEAN	SEM
Annuals	EB1	52	4.96	2.094	52	3.38	1.193
	EB2	61	6.73	2.807	61	2.60	0.613
	EB3	47	9.72	3.532	49	14.43	4.082
Perennials	EB1	52	95.04	2.094	52	96.62	1.193
	EB2	61	93.27	2.807	61	97.40	0.613
	EB3	47	90.28	3.532	49	85.57	4.082
Fine grass	EB1	52	26.68	3.575	52	28.85	4.029
	EB2	61	27.85	2.681	61	29.14	3.197
	EB3	47	21.57	3.459	49	28.83	3.694
Coarse grass	EB1	52	42.51	3.753	52	39.37	3.639
	EB2	61	40.15	2.933	61	42.11	3.220
	EB3	47	47.47	3.774	49	38.89	3.529
Forbs	EB1	52	19.02	2.505	52	22.65	2.874
	EB2	61	20.70	2.291	61	20.09	2.060
	EB3	47	18.55	2.459	49	20.57	2.127
Woody species	EB1	52	2.77	1.010	52	2.75	0.640
	EB2	61	3.26	0.833	61	4.26	0.643
	EB3	47	2.87	1.038	49	3.28	1.308
Bare ground	EB1	52	6.52	2.051	52	4.75	1.530
	EB2	61	6.44	1.621	61	4.16	1.500
	EB3	47	6.57	2.116	49	5.53	1.336
Dead vegetation	EB1	52	2.50	0.909	52	1.63	0.724
	EB2	61	1.59	0.854	61	0.23	0.097
	EB3	47	2.96	1.216	49	2.89	1.188

Surveyors were also asked to assess whether hedgerows were clearly ‘old’. Sixty seven percent of those hedges included in the in-farm comparisons were considered old, and there was no significant difference between the proportions considered old for ELS hedges and in-farm control hedges (Figure 49).

Chi-square test for association between hedgerow age and ELS option/control:

EB1: Pearson chi-square value is 1.41 with 2 d.f.
Probability level (under null hypothesis) p = 0.493.

EB2: Pearson chi-square value is 1.23 with 2 d.f.
Probability level (under null hypothesis) p = 0.540

EB3: Pearson chi-square value is 4.62 with 2 d.f.
Probability level (under null hypothesis) p = 0.099

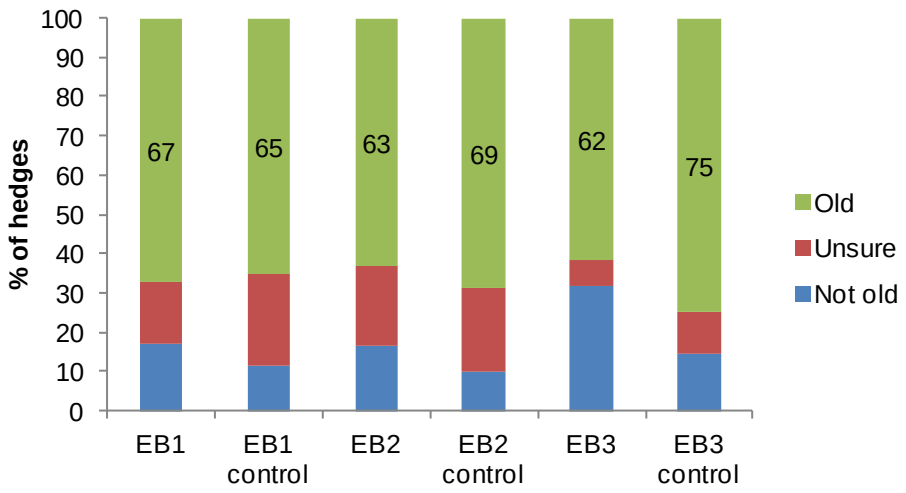


Figure 49. The percentage of ELS hedges and on-farm control hedges assessed as 'old hedgerows'.

4.6.2 Hedges: comparison of ELS options with non-participant farms

ELS hedges were compared with control hedges from non-participant farms for the same range of attributes; the results are presented in Table 134.

The control hedges recorded on non-participant farms included a whole range from closely clipped to unmanaged; for many variables the means fell within the range recorded for ELS hedges. Statistically significant differences were recorded for the following attributes (Figure 50):

- **Hedge height and width:** there is a gradation in mean height and width from EB1 through EB2 to EB3; the control hedges on non-participant farms were on average between the EB1 and EB2 heights and widths. The EB3 enhanced hedges were significantly taller and significantly wider than the control and EB1 hedges.
- **Percentage of hedgerow shrubs flowering or fruiting:** the control hedges on non-participant farms had on average a greater cover of flowers/fruits than the EB1 and EB2 hedges but less than the EB3. The significant difference was between the EB3 and EB1 & 2 hedges.
- **Cover of bramble:** the significant difference was between the EB1 hedges (lowest) and the EB2 hedges (highest) with the control hedges intermediate between these options.
- **Width of uncultivated strip (width from centre of hedge to cultivation):** the uncultivated strips were on average narrower on the non-participant farms than on ELS farms with a statistically significant difference between the NP controls and EB2, which was the option with widest strips.

Table 134. Comparison of ELS hedges and controls on non-participant farms. Where tests are statistically significant, F probabilities are in bold and shaded.

Hedge Attributes		Observed			*Stats output (back-transformed)*	
		N	Farm mean	SEM	*Predicted mean*	*F prob*
Hedge height (m)	EB1	58	3.26	0.166	*3.08*	
	EB2	68	4.01	0.170	*3.64*	
	EB3	49	4.73	0.267	*3.89*	
	NP	22	3.56	0.300	*3.14*	***0.001***
Canopy height (m)	EB1	58	0.64	0.047	*0.53*	
	EB2	68	0.62	0.034	*0.54*	
	EB3	49	0.69	0.052	*0.54*	
	NP	22	0.63	0.061	*0.56*	*0.982*
Hedge width (m)	EB1	58	2.77	0.118	*2.61*	
	EB2	68	3.10	0.100	*2.90*	
	EB3	49	3.71	0.219	*3.14*	
	NP	22	2.91	0.246	*2.63*	***0.003***
Percentage gaps	EB1	57	3.81	0.753	*1.38*	
	EB2	68	4.35	1.085	*1.10*	
	EB3	48	3.38	0.658	*1.26*	
	NP	22	2.46	0.873	*0.79*	*0.420*
5 m gaps present?	EB1	57	13.85	2.902	*15.15*	
	EB2	68	20.73	3.630	*20.11*	
	EB3	48	20.64	4.888	*19.17*	
	NP	22	8.45	3.775	*10.17*	*0.356*
No. shrub species per 30 m	EB1	57	3.71	0.182	*3.26*	
	EB2	67	3.98	0.150	*3.59*	
	EB3	49	3.83	0.200	*3.55*	
	NP	22	3.89	0.327	*3.44*	*0.182*
Percentage shrubs with flowers/fruits	EB1	58	14.73	2.810	*5.28*	
	EB2	68	16.86	2.150	*6.69*	
	EB3	49	30.10	3.579	*12.58*	
	NP	22	18.86	4.470	*8.02*	***0.001***
Native boundary Trees?	EB1	57	48.81	5.060	*49.70*	
	EB2	64	64.84	4.818	*62.29*	
	EB3	45	53.31	6.287	*52.17*	
	NP	22	57.91	8.550	*52.24*	*0.426*
Width uncultivated Strip (m)	EB1	35	3.92	0.360	*3.14*	
	EB2	43	4.09	0.326	*3.48*	
	EB3	29	3.43	0.295	*3.19*	
	NP	14	2.71	0.258	*2.45*	***0.040***
Width perennial Vegetation (m)	EB1	36	2.68	0.341	*1.16*	
	EB2	45	2.54	0.305	*1.16*	
	EB3	30	1.85	0.244	*1.72*	
	NP	18	1.37	0.195	*1.76*	*0.123*
Cover injurious Species (%)	EB1	57	4.12	0.572	*2.16*	
	EB2	68	3.23	0.323	*2.03*	
	EB3	49	3.34	0.393	*2.28*	
	NP	22	3.31	0.592	*2.00*	*0.864*
Cover nitrophilous Species (%)	EB1	57	11.61	1.491	*6.17*	
	EB2	68	12.24	1.348	*7.08*	
	EB3	49	11.61	1.738	*5.26*	
	NP	22	10.83	1.532	*7.32*	*0.191*
Cover bramble (%)	EB1	57	1.95	0.367	*1.19*	
	EB2	68	3.81	0.611	*1.88*	
	EB3	49	2.98	0.539	*1.47*	
	NP	22	4.10	1.534	*1.78*	***0.022***
Cover insect-pollinated Species (%)	EB1	55	10.58	1.062	*6.88*	
	EB2	64	11.72	1.003	*9.08*	
	EB3	47	11.61	1.444	*9.81*	
	NP	22	13.15	2.319	*8.65*	*0.685*

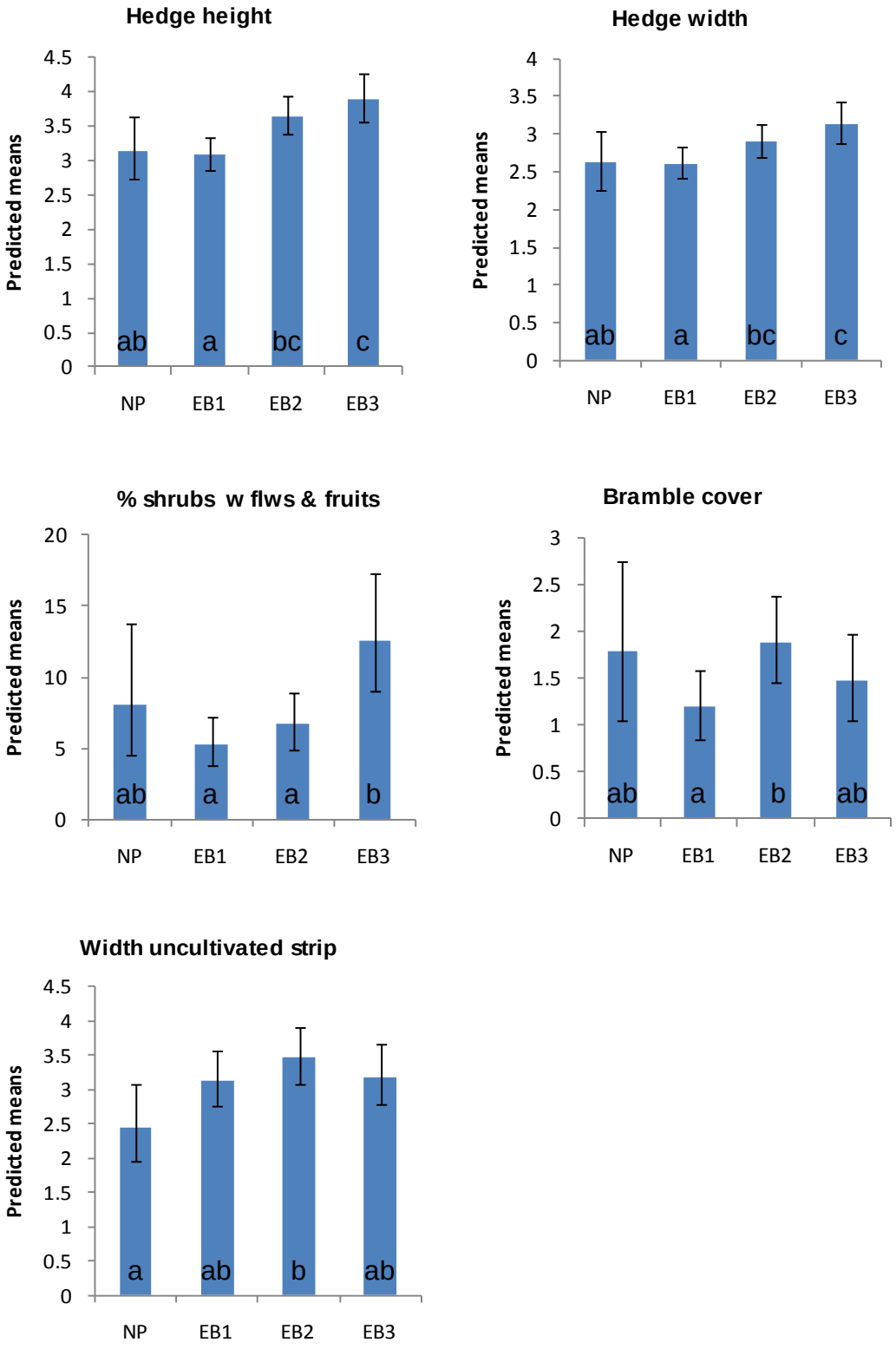


Figure 50. Comparison of ELS hedges with control hedges on non-participant farms: predicted means (back-transformed) with 95% confidence limits. Bars with the same letters are not significantly different. (Fisher's unprotected least significant difference test).

In addition to the variables in Table 134, the vegetation composition in the strip adjacent to the hedges was recorded in terms of different plant groups: firstly, annuals and perennials (adding to 100% cover) and secondly, fine grasses, coarse grasses, forbs, woody species, bare ground and dead vegetation (adding to 100% cover). The means and standard errors for these categories are given in Table 135. Since these are compositional data, they were analysed by multivariate analysis of variance after suitable transformation.

The difference in the proportion of annuals to perennials was statistically significant between the hedge categories (F probability = 0.027); the controls had the lowest proportion of annuals while EB3 had the highest.

There was a significant difference in the proportion of woody species present (F probability = 0.003) with a higher proportion of woody species present in strips adjacent to EB2 hedges.

Table 135. Mean percentage cover for plant categories in uncultivated strips next to ELS and NP hedges.

Vegetation Categories		OBSERVED MEASUREMENTS		
		N	MEAN	SEM
Annuals	EB1	162	4.44	0.95
	EB2	179	4.64	1.12
	EB3	117	8.29	2.05
	NP control	59	3.55	1.23
Perennials	EB1	162	95.56	0.95
	EB2	179	95.36	1.12
	EB3	117	91.71	2.05
	NP control	59	96.45	1.23
Fine grass	EB1	162	26.08	2.000
	EB2	179	22.98	1.707
	EB3	117	25.89	2.132
	NP control	59	24.45	2.705
Coarse grass	EB1	162	40.41	2.035
	EB2	179	41.18	1.777
	EB3	117	37.73	2.200
	NP control	59	39.24	2.326
Forbs	EB1	162	22.49	1.445
	EB2	179	23.90	1.314
	EB3	117	23.48	1.608
	NP control	59	27.05	2.115
Woody species	EB1	162	3.49	0.383
	EB2	179	5.59	0.692
	EB3	117	3.51	0.642
	NP control	59	3.31	0.727
Bare ground	EB1	162	5.07	0.924
	EB2	179	4.52	0.753
	EB3	117	6.56	1.058
	NP control	59	2.50	0.506
Dead vegetation	EB1	162	2.46	0.722
	EB2	179	1.83	0.628
	EB3	117	2.83	0.962
	NP control	59	3.47	1.376

Two thirds (69%) of hedgerows assessed were clearly 'old'. There were significant differences between the proportions considered old for ELS hedges and NP control hedges (Table 136 & Figure 51). The NP controls and EB3 hedges had a higher proportion of 'old' hedges (73%) compared to EB1 and EB2 (65%), but the biggest difference was the higher proportion of hedges in the 'unsure' category in EB2.

Table 136. The percentage of ELS hedges and NP hedges considered as 'old hedgerows'.

Hedges	Not old	Unsure	Old
NP	20.3	6.8	72.9
EB1	26.2	8.9	64.9
EB2	18.7	16.5	64.8
EB3	22.9	4.1	72.9

Chi-square test for association between hedgerow age and ELS/NP:

Pearson chi-square value is 15.97 with 6 d.f.
Probability level (under null hypothesis) p = 0.014

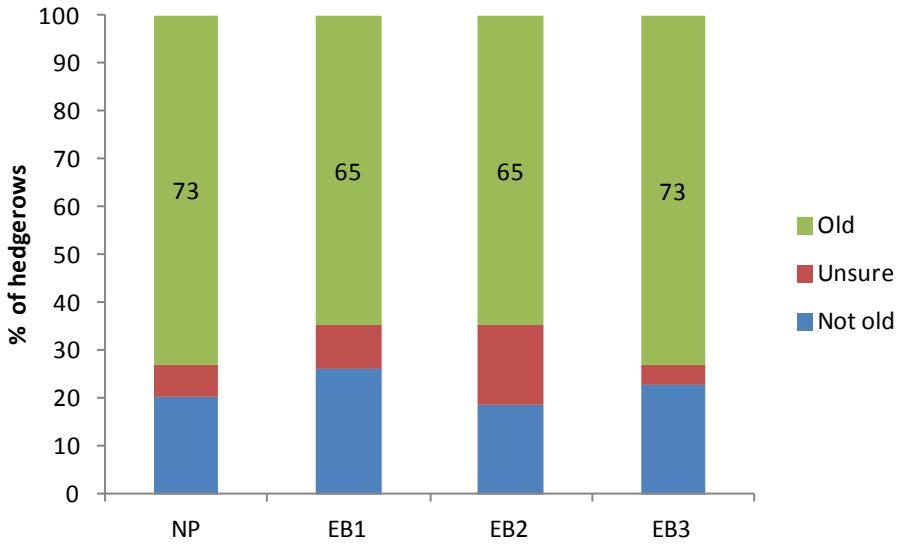


Figure 51. The percentage of ELS hedges and non-participant control hedges assessed as 'old hedgerows'.

4.6.3 Ditches: comparison of ELS options with ditches on non-participant farms

None of the variables analysed showed statistically significant differences between ditch options and NP controls.

Table 137. Comparison of ELS ditch options with non-participant farms.

Ditch Attributes		OBSERVED MEASUREMENTS			*STATS OUTPUT (back-transformed)*	
		N	FARM MEAN	SEM	*ELS mean*	*F prob*
Floating vegetation (% of features)	EB6	37	15.30	5.420	*13.75*	
	EB7	15	34.40	10.300	*35.14*	
	NP	16	13.50	7.640	*17.14*	*0.113*
Emergent vegetation (% of features)	EB6	37	54.50	6.950	*52.50*	
	EB7	15	47.80	11.100	*54.05*	
	NP	16	61.50	11.400	*54.29*	*0.989*
Non-aquatic vegetation (% of features)	EB6	38	70.20	6.980	*64.47*	
	EB7	15	70.00	10.300	*72.97*	
	NP	16	52.10	11.800	*42.86*	*0.157*
No. native aquatics per 20 m length	EB6	37	1.52	0.345	*1.87*	
	EB7	15	1.46	0.440	*2.01*	
	NP	16	1.99	0.597	*2.15*	*0.687*
CSS width from mid-ditch (m)	EB6	35	5.34	0.704	*3.66*	
	EB7	15	4.53	0.642	*4.10*	
	NP	12	3.55	0.657	*3.16*	*0.529*
CSS width from top of bank (m)	EB6	33	4.41	0.798	*2.28*	
	EB7	14	2.66	0.529	*2.22*	
	NP	12	2.24	0.615	*1.50*	*0.398*
Mean number of species	EB6	39	6.47	0.262	*6.09*	
	EB7	15	6.13	0.522	*5.79*	
	NP	17	6.39	0.496	*5.97*	*0.680*

4.6.4 Hedge-ditch combinations: comparisons of ELS options with non-participant farms

The results from the statistical analysis are shown in Table 138 and Figure 52.

Hedge heights showed a difference between the non-participant control hedges (which were the shortest group) and EB8, versus EB9 and EB10, with the latter pair significantly taller.

The width of the uncultivated strip, as measured between the middle of the ditch and the edge of cultivation, was significantly narrower for features managed as EB10, however the sample size for EB10 was only 4 farms. The same relationship was shown for the width of perennial vegetation between the top of the ditch bank and start of cultivation, with the strip significantly narrower when next to EB10 compared to the controls and other ELS options.

Table 138. Comparisons of hedge-ditch combinations between ELS and NP controls. Where tests are statistically significant, F probabilities are in bold and shaded.

Hedge & ditch Attributes		OBSERVED MEASUREMENTS			*STATS OUTPUT (back-transformed)*	
		N	Farm mean	SEM	*Predicted mean*	*F prob*
Hedge height (m)	EB8	26	3.63	0.321	*3.25*	
	EB9	19	4.58	0.304	*4.28*	
	EB10	7	4.58	0.685	*4.20*	
	NP	17	3.38	0.306	*3.13*	***0.003***
Canopy height (m)	EB8	26	0.64	0.112	*0.50*	
	EB9	19	0.62	0.082	*0.53*	
	EB10	7	0.69	0.074	*0.62*	
	NP	17	0.61	0.062	*0.56*	*0.650*
Hedge width (m)	EB8	26	2.93	0.132	*2.87*	
	EB9	19	3.43	0.219	*3.18*	
	EB10	7	3.57	0.336	*3.11*	
	NP	17	3.30	0.317	*2.96*	*0.564*
Percentage gaps	EB8	26	1.62	0.614	*0.64*	
	EB9	19	2.57	1.070	*0.84*	
	EB10	7	2.05	1.437	*0.84*	
	NP	17	5.44	2.258	*1.58*	*0.352*
Number of woody species	EB8	26	4.12	0.221	*3.75*	
	EB9	19	4.33	0.376	*4.10*	
	EB10	7	4.33	0.424	*4.05*	
	NP	17	3.97	0.336	*3.55*	*0.588*
Percentage of shrubs with flowers/fruits	EB8	26	15.74	3.427	*7.29*	
	EB9	18	14.36	2.651	*10.32*	
	EB10	7	27.14	5.895	*13.71*	
	NP	16	12.48	4.620	*5.58*	*0.277*
Native boundary trees?	EB8	26	69.92	6.210	*66.67*	
	EB9	17	60.38	11.074	*45.95*	
	EB10	7	69.00	15.631	*50.00*	
	NP	17	76.47	9.699	*62.50*	*0.343*
Non-aquatic vegetation?	EB8	26	71.80	7.940	*69.84*	
	EB9	17	76.50	9.800	*68.42*	
	EB10	6	83.30	16.700	*76.92*	
	NP	17	52.90	11.700	*46.88*	*0.464*
CSS width uncultivated strip (m)	EB8	18	4.17	0.416	*4.29*	
	EB9	14	5.59	1.035	*4.12*	
	EB10	4	3.73	1.328	*1.83*	
	NP	11	4.46	0.776	*3.93*	***0.001***
CSS width perennial vegetation (m)	EB8	20	2.47	0.362	*2.36*	
	EB9	15	4.02	0.902	*2.21*	
	EB10	4	2.55	1.179	*0.83*	
	NP	12	2.70	0.536	*2.13*	***0.001***
Number of species on bank	EB8	25	6.43	0.399	*6.32*	
	EB9	19	5.78	0.347	*5.68*	
	EB10	7	6.98	0.765	*5.94*	
	NP	16	6.58	0.421	*6.16*	*0.467*
Cover insect-pollinated species on bank (%)	EB8	25	17.51	2.172	*13.55*	
	EB9	17	16.60	2.920	*12.48*	
	EB10	6	27.11	6.174	*15.83*	
	NP	15	23.19	3.445	*17.29*	*0.657*
Cover insect-pollinated species on CCS (%)	EB8	24	17.19	2.405	*11.40*	
	EB9	18	13.56	2.449	*9.76*	
	EB10	7	20.62	5.351	*11.79*	
	NP	17	19.55	3.096	*12.81*	*0.800*

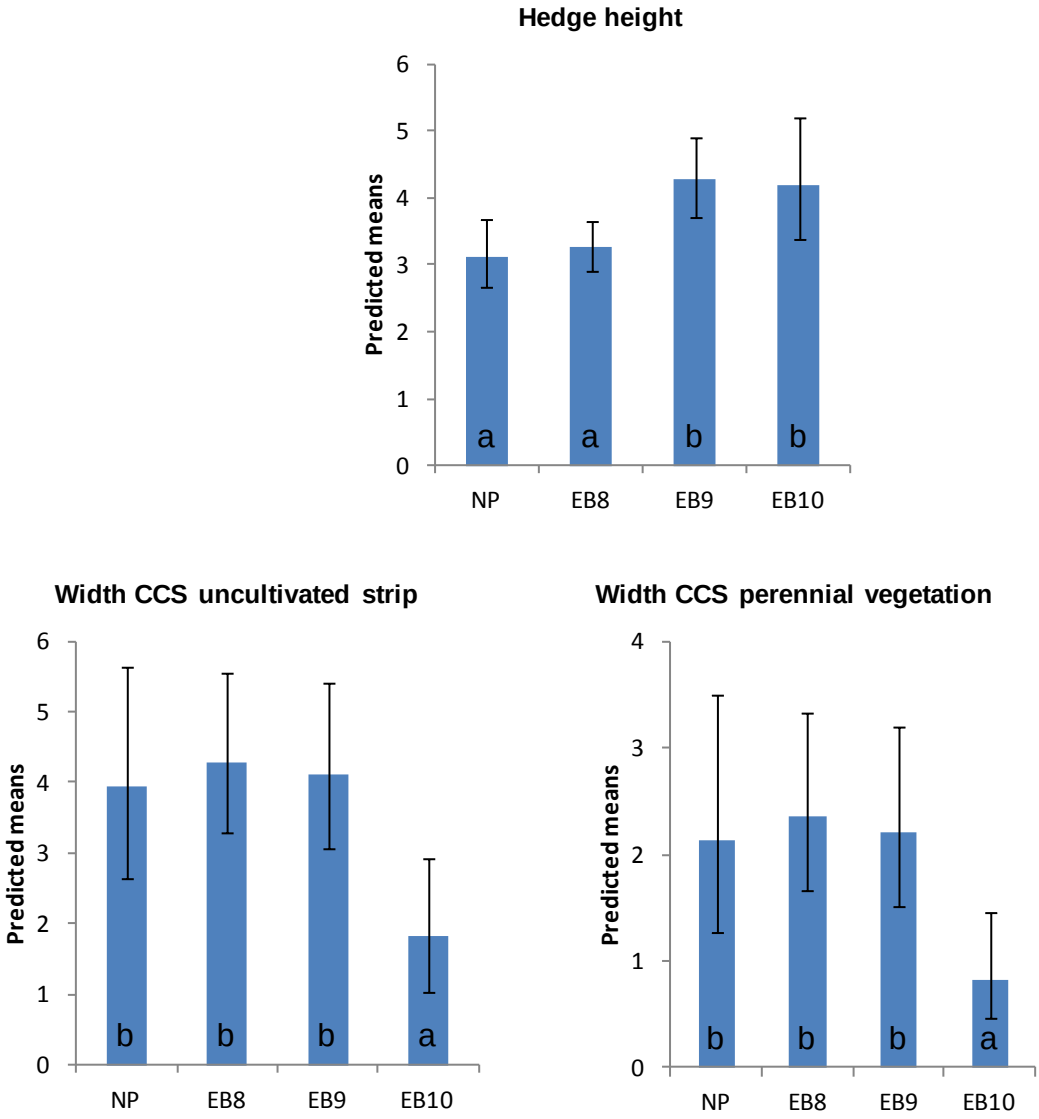


Figure 52. Comparisons between ELS hedge-ditch combinations with similar features from non-participant farms (NP).

Hedgerow age: there was no statistically-significant difference between ELS options and controls, in the proportion of hedge-ditch combinations which were assessed by surveyors as old hedgerows.

Chi-square test for association between old hedgerows and ELS option/controls:

Pearson chi-square value is 6.70 with 6 d.f.
Probability level (under null hypothesis) p = 0.350

4.6.5 In-field trees in grassland fields: comparisons of ELS options with non-participant farms

The management of in-field trees was recorded as the presence or absence of damage from various sources (supplementary feeding, storage etc) on up to three trees per farm; the variable was then expressed as the percentage of trees with that impact per farm. In most cases, there were insufficient instances of damage to analyse statistically. The exception was livestock damage, for which there was an average of 22% damaged EC2 trees on ELS farms, compared with 27% on non-participant farms; this difference was not statistically significant (F probability 0.61).

The age distribution of sampled in-fields trees did show a statistically-significant difference between ELS farms and NP farms. There were more mature trees under ELS options and fewer veteran trees compared with the control trees on NP farms (Figure 53). The veteran group (>1 m diameter) was the largest category on the NP farms. The middle group (20-99 cm) was the largest group on the ELS farms. There were very few trees recorded in the young group (<20 cm diameter); these are not eligible for ELS which requires a minimum diameter of 30 cm.

Chi-square test for association between tree age and EC2/control:

Pearson chi-square value is 10.11 with 2 d.f.
Probability level (under null hypothesis) p = 0.006,
Contingency table permutation test probability = 0.008.

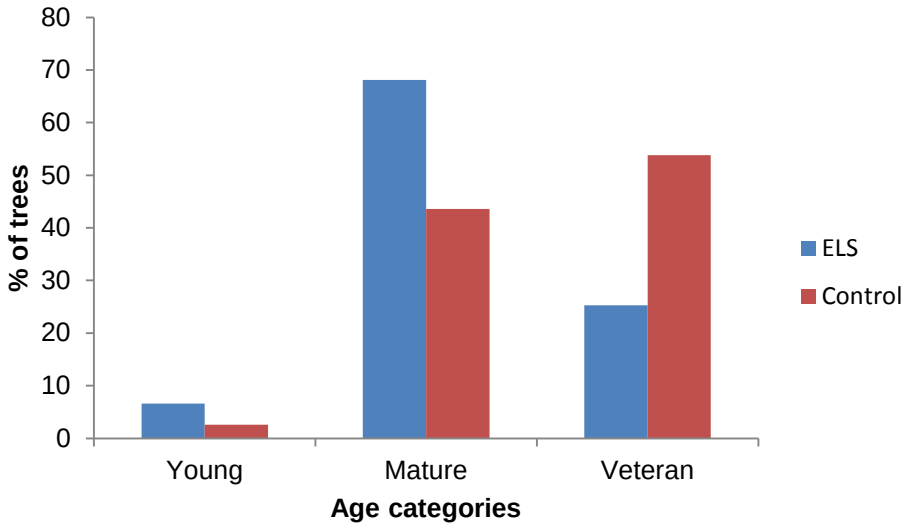


Figure 53. The distribution of age categories of in-field trees in grassland on ELS and NP farms.

4.6.6 Buffers in arable fields: comparisons of ELS options with non-participant farms

ELS buffer strips in arable fields (EE1: 2 m, EE2: 4 m and EE3: 6 m) were compared for a variety of attributes, with controls on non-participant farms; the results are shown in Table 139, and Figure 54. There was a significant difference between strip widths for the different ELS options, while the control strips averaged a width between that of EE2 and EE3. The mean buffer width was wider than the prescribed width, for each of the ELS options.

Table 139. Comparisons of buffer strips on ELS and NP farms. Where tests are statistically significant, F probabilities are in bold and shaded.

Buffer Attributes		OBSERVED MEASUREMENTS			*STATS OUTPUT (back-transformed)*	
		N	FARM MEAN	SEM	*ELS mean*	*F prob*
Width of strip (m)	EE1	8	2.96	0.608	*2.44*	
	EE2	17	5.04	0.381	*4.68*	
	EE3	20	6.43	0.227	*6.47*	
	NP	12	6.06	0.874	*5.15*	***0.001***
Position on slope of benefit to RP?	EE1	8	33.30	15.400	*33.33*	
	EE2	17	29.40	10.600	*31.58*	
	EE3	20	30.00	9.260	*30.00*	
	NP	12	45.80	13.000	*46.43*	*0.815*
% bare ground/ vegetation <10cm	EE1	8	15.00	12.170	*1.51*	
	EE2	17	13.10	4.485	*4.66*	
	EE3	20	16.33	6.435	*4.26*	
	NP	12	22.26	7.299	*9.76*	*0.815*
mean % forbs	EE1	8	22.00	8.098	*1.02*	
	EE2	17	18.04	2.871	*1.38*	
	EE3	20	17.92	2.827	*1.44*	
	NP	12	25.40	4.322	*1.95*	*0.408*

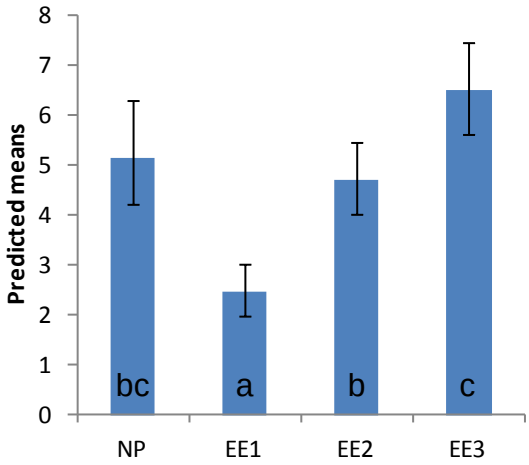


Figure 54. Variation in the width (m) of buffer strips on ELS and NP farms.

Compaction in buffer strips: the ELS prescription states that buffer strips must not be used for regular vehicular access or turning and that there should be no tracks or compacted areas. Surveyors recorded compaction on buffer strips in four categories – see Table 140.

Table 140. Number of features with different degrees of compaction on ELS and NP buffer strips in arable fields.

Option	No compaction	Footpath or animal tracks	Occasional vehicle use	Severe vehicle use	Total
NP control	7	7	13	1	28
EE1	14	1	3	0	18
EE2	16	5	16	0	37
EE3	21	7	22	0	50
Total	**58**	**20**	**54**	**1**	**133**
%	**44%**	**15%**	**41%**	**1%**	

Half of the ELS strips showed no compaction compared with a quarter of the control strips. 39% of ELS strips showed signs of occasional vehicle use compared with 46% of control strips. There was only one instance of severe compaction recorded on a NP control strip.

In order to carry out a statistical test of the difference between the control and ELS strips the one 'severe' record was combined with the 'occasional' records. The analysis indicates that there is a significant difference between the four buffer categories, with a greater proportion of EE1 features having 'no compaction' and fewer in the 'occasional/severe' group than would be expected.

Chi-square test for association between compaction groups and ELS/controls:

Pearson chi-square value is 13.37 with 6 d.f.

Probability level (under null hypothesis) p = 0.038

4.6.7 Low-input grasslands: comparisons of ELS options with in-farm controls

ELS low-input grasslands were compared with controls on the same farms for a variety of attributes; the results are presented in Table 141.

The only variable which showed a significant difference was sward height where a significantly higher proportion of the EK3 swards were over 7 cm compared with their controls (Figure 55) and mean height was greater on both ES options compared with controls (Figure 56).

Table 141. Comparisons of low-input ELS grasslands and in-farm control grasslands. Where tests are statistically significant, F probabilities are in bold and shaded.

Grassland Attributes		OBSERVED MEASUREMENTS						*STATS OUTPUT*		
		ELS SAMPLE			CONTROL			*(back-transformed)*		
		N	FARM MEAN	SEM	N	FARM MEAN	SEM	*ELS mean*	*control mean*	*F prob*
Number of species m^{-2}	EK2	32	7.48	0.550	32	7.96	0.652	*6.90*	*7.32*	*0.275*
	EK3	29	8.68	0.635	29	7.64	0.584	*7.11*	*8.06*	*0.061*
Undesirable species cover (%)	EK2	32	3.47	0.633	31	3.42	0.676	*2.21*	*2.23*	*0.981*
	EK3	29	5.14	1.065	29	4.10	0.793	*2.69*	*3.19*	*0.579*
Cover insect-pollinated sp (%)	EK2	28	17.82	3.045	27	21.41	3.345	*10.83*	*14.63*	*0.052*
	EK3	25	21.32	4.076	23	17.13	3.120	*11.00*	*11.74*	*0.753*
Vehicle Access?	EK2	31	0.36	0.087	29	0.35	0.090	*35.48*	*34.48*	*0.944*
	EK3[12]	28	0.18	0.074	25	0.20	0.082			
Vegetation over 7 cm (%)[13]	EK2	28	58.21	6.781	24	50.42	6.882	*59.44*	*47.08*	*0.151*
	EK3	24	78.13	4.286	20	57.75	6.934	*78.29*	*58.51*	***0.011***
Mean height (cm)[13] (not transformed)	EK2	28	10.1	0.34	25	8.6	0.30	*10.5*	*7.9*	***<0.001***
	EK3	25	15.1	0.52	21	9.5	0.28	*14.9*	*10.3*	***<0.001***

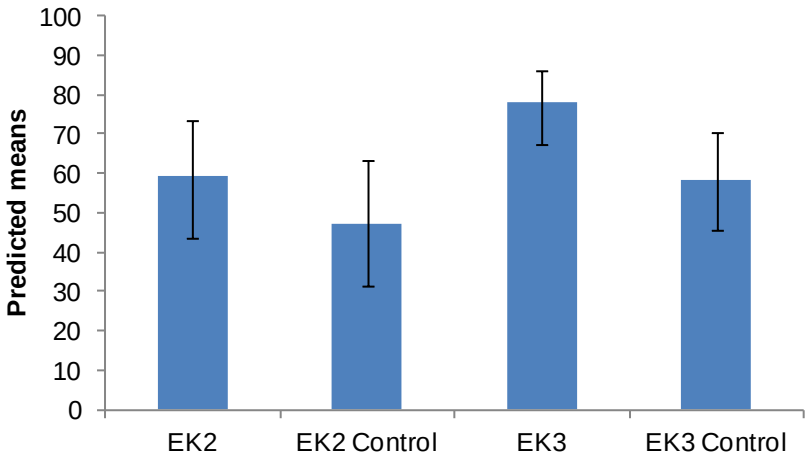


Figure 55. Low-input grassland sward height: the percentage of vegetation over 7 cm in ELS fields and on-farm controls. (only EK3 is significantly different from its control)

[12] Insufficient positive data to analyse.

[13] Measured with a drop disc.

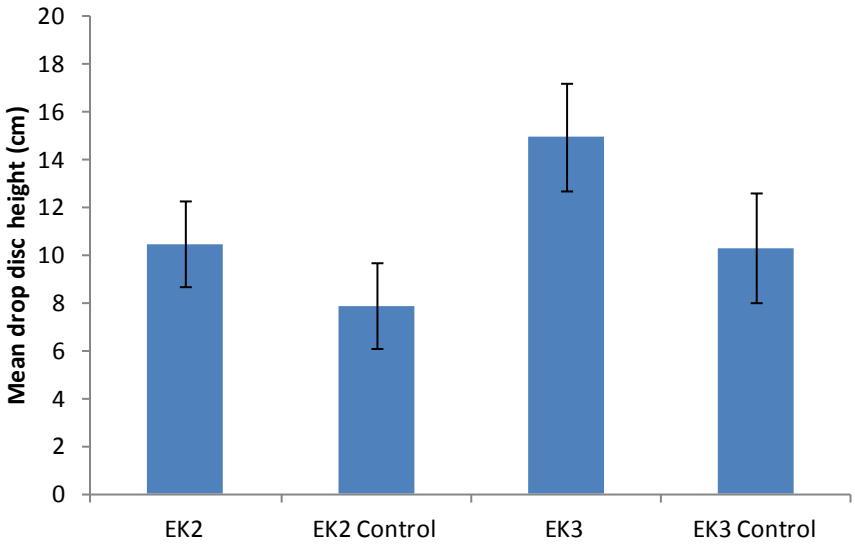


Figure 56. Low input grassland mean sward height measured with a drop disc (cm) in ELS fields and on-farm controls.

4.6.8 Low-input grasslands: comparisons of ELS options with non-participant farms

Attributes of ELS low-input grasslands were analysed with similar grassland controls on non-participant farms; the results are presented in Table 142.

There were significant differences in the number of species recorded in randomly-located 1x1 m quadrats (Figure 57), in the proportion of the sward over 7 cm (Figure 58) and in mean height (Figure 59), but in all cases the difference was greatest between the EK2 and EK3 grasslands with the controls intermediate between the two ELS options.

Table 142. Low-input grasslands: comparisons of ELS options with NP farms.

Grassland Attributes		OBSERVED MEASUREMENTS			*STATS OUTPUT (back-transformed)*	
		N	FARM MEAN	SEM	*ELS mean*	*F prob*
Number of species m^{-2}	EK2	67	7.67	0.378	*6.95*	
	EK3	56	8.79	0.414	*8.54*	
	NP	33	8.00	0.516	*7.47*	***0.001***
Undesirable species cover (%)	EK2	67	3.41	0.397	*2.47*	
	EK3	55	5.00	0.707	*3.23*	
	NP	33	4.71	0.960	*2.99*	*0.316*
Insect-pollinated species cover (%)	EK2	62	15.48	1.196	*9.18*	
	EK3	49	18.67	2.428	*12.73*	
	NP	29	16.48	2.833	*11.01*	*0.153*
Vehicle access	EK2	66	33.30	5.539	*34.18*	
	EK3	54	22.20	5.711	*21.67*	
	NP	31	29.00	7.956	*30.30*	*0.340*
Supplementary feeding	EK2	67	21.64	4.900	*23.75*	
	EK3	56	17.86	5.004	*17.74*	
	NP	33	27.27	7.873	*25.72*	*0.614*
Vegetation over 7cm (%)[14]	EK2	58	60.52	4.192	*62.04*	
	EK3	50	79.85	3.064	*80.44*	
	NP	25	70.60	5.960	*70.91*	***0.002***
Mean height (cm)[14] (not transformed)	EK2	56	10.7	0.25	*12.4*	
	EK3	50	18.6	0.59	*17.4*	
	NP	25	12.5	0.58	*12.5*	***<0.001***

[14] Measured with a drop disc.

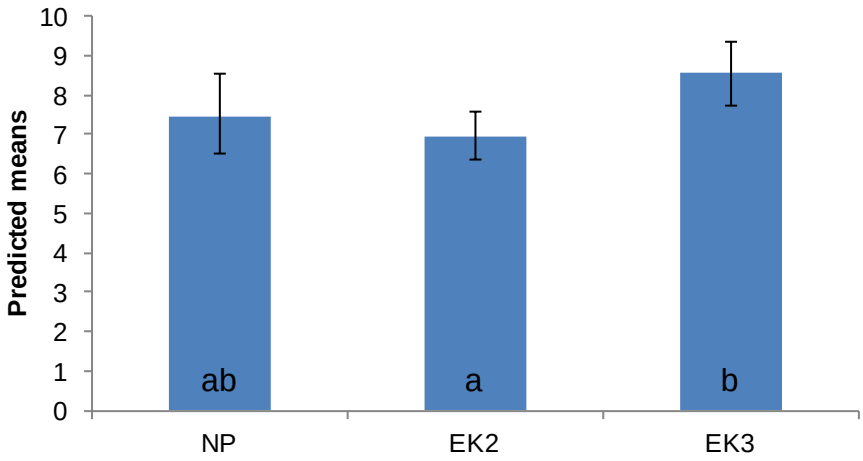


Figure 57. Low-input grasslands: differences in mean species number m^{-2} in ELS fields and controls on non-participant farms.

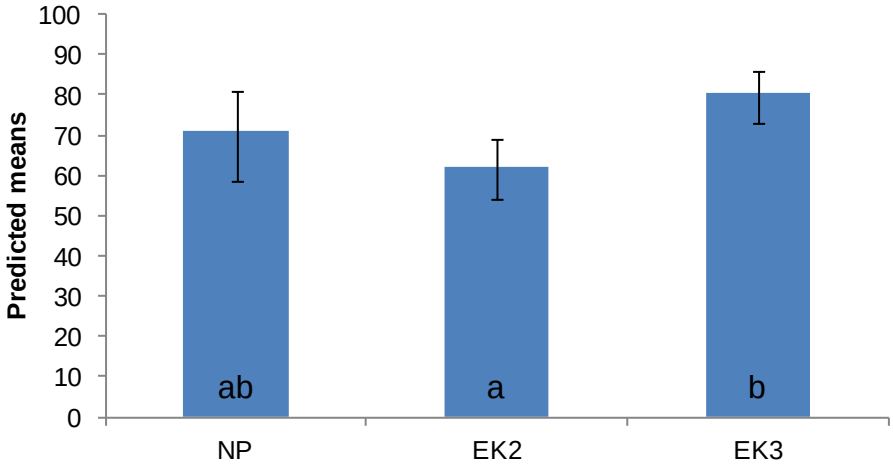


Figure 58. Low-input grasslands: differences in the proportion of sward over 7 cm in ELS fields and controls on non-participant farms.

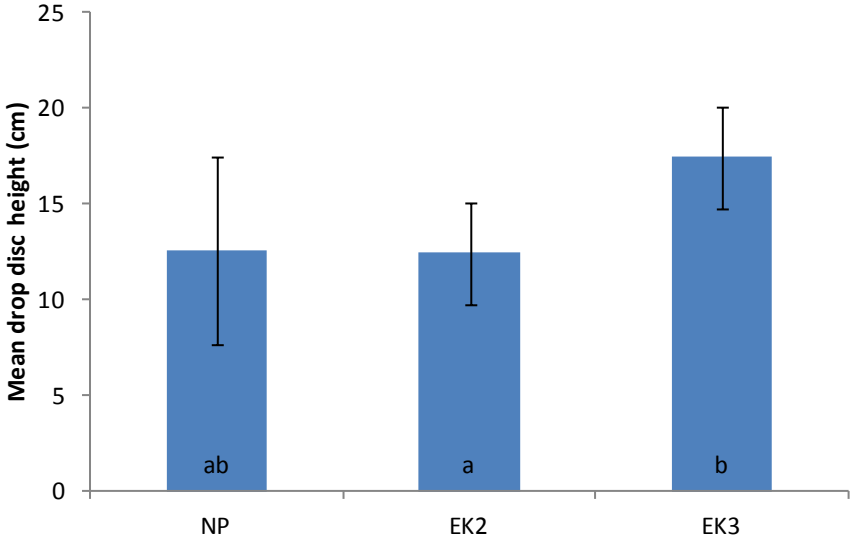


Figure 59. Low input grassland mean sward height measured with a drop disc (cm) in ELS fields and controls on non-participant farms.

4.7 Detailed grassland assessments

Additional assessments were made on a subset of farms with low-input grassland options (EK2, EK3) to establish whether farmers were meeting the prescription requirements, in particular relating to maintaining a varied sward height on grazed fields.

Analysis of variance for mean height (measured with the HFRO sward stick) indicated that there was a significant difference both between options (p=0.002, 1 d.f.) and between months (p=0.010; 2 d.f.), although differences in height were small. Six fields were found to be shut up for hay or silage cutting during the season despite the farmer having indicated that they would be exclusively grazed. These have been excluded from the analysis. O/EK3 swards were taller on average than O/EK2 swards and swards were taller in July compared to May and October (Figure 60).

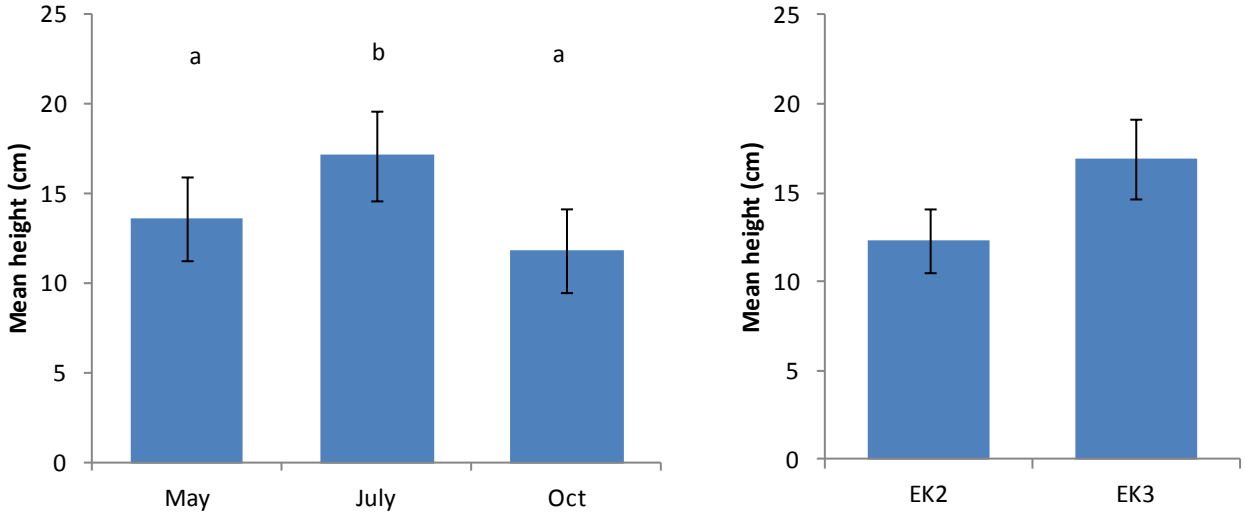


Figure 60. Mean sward height, measured with a HFRO sward stick (predicted means and 95% confidence intervals).

Variability in sward height measurements is presented as box and whisker plots for O/EK2 and O/EK3 (Figure 61 and Figure 62). Site numbers for fields shut up for hay or silage are displayed in bold and those under organic options are presented in italics. The box element of the figures represent quartile 1 (Q1) to quartile 3 (Q3) with the median marked within. The bars (whiskers) extend to the last measurement within 1.5 x the interquartile range. Records that lie more than 1.5 times the interquartile distance from Q1 or Q3 are marked as points. Figures with a restricted y axis are also presented (Figure 63 and Figure 64).

Two analyses of the variability in height were carried out. The first investigated whether the data show evidence of differing variability between months (as well as presenting the variance for each of those months). This was done for each option and each farm separately. Fields that were recorded as shut for hay or silage cutting at some point in the season were excluded from these analyses. A summary of analysis for individual fields is presented in Table 143. In about three quarters of fields there was a significant difference between months in the variability of sward

height. Where variance was significantly different, variability was most frequently (more than half of fields) greatest in July, although not always significantly different from both May and October.

The second analysis investigates whether the data show evidence of differing variability between the two options (O/EK2 and O/EK3) in July. Note that, in this analysis, variability is defined as "within farm" variability and "between farms" variability combined. Variance was greater for fields in O/EK3 (322.0) compared to O/EK2 (121.2) and the difference was highly significant ($p=2.20 \times 10^{-16}$; F69.2; 1,1638 d.f.).

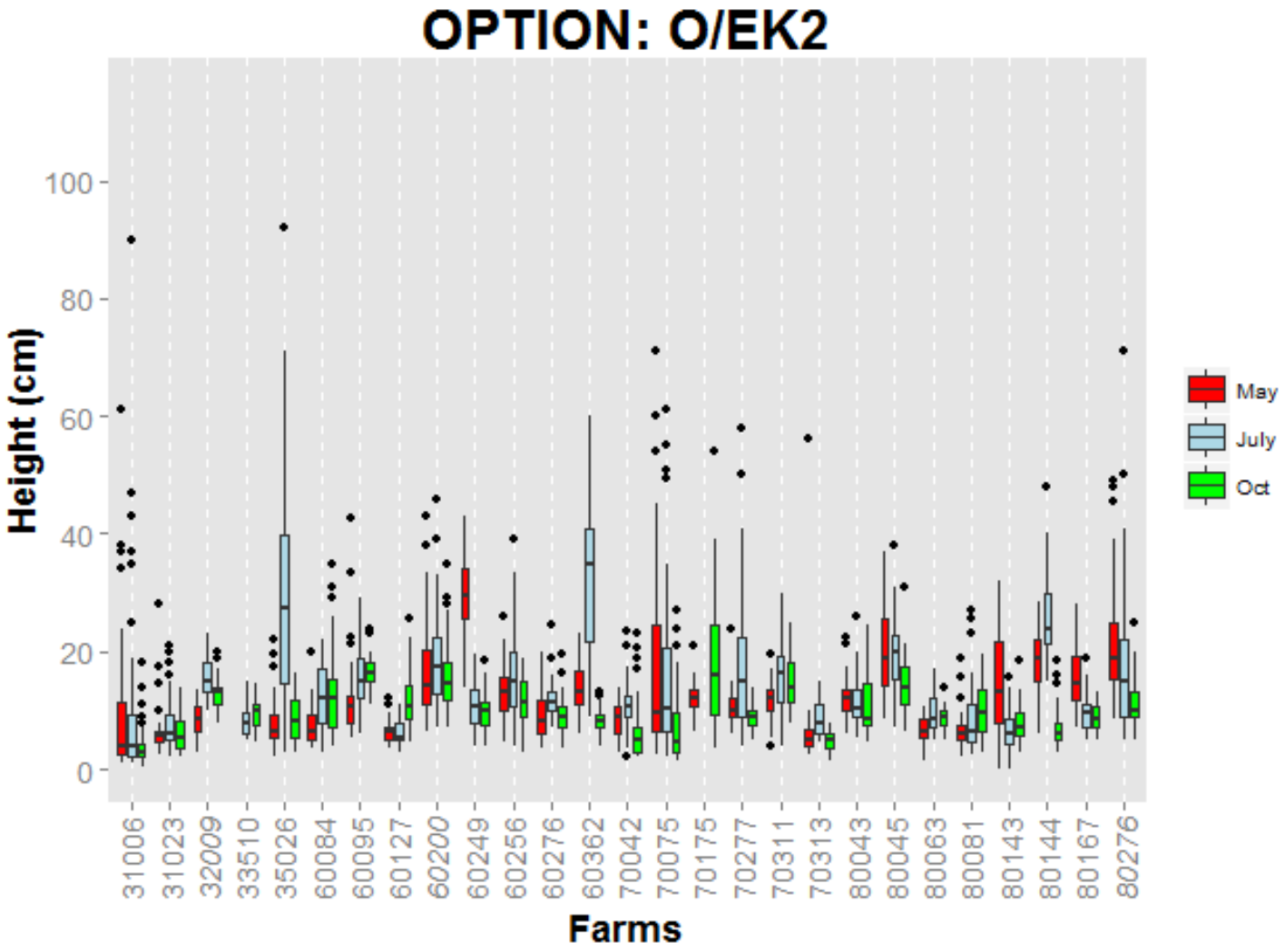


Figure 61. Variability in sward height measurements (using a HFRO sward stick) for fields in EK2.

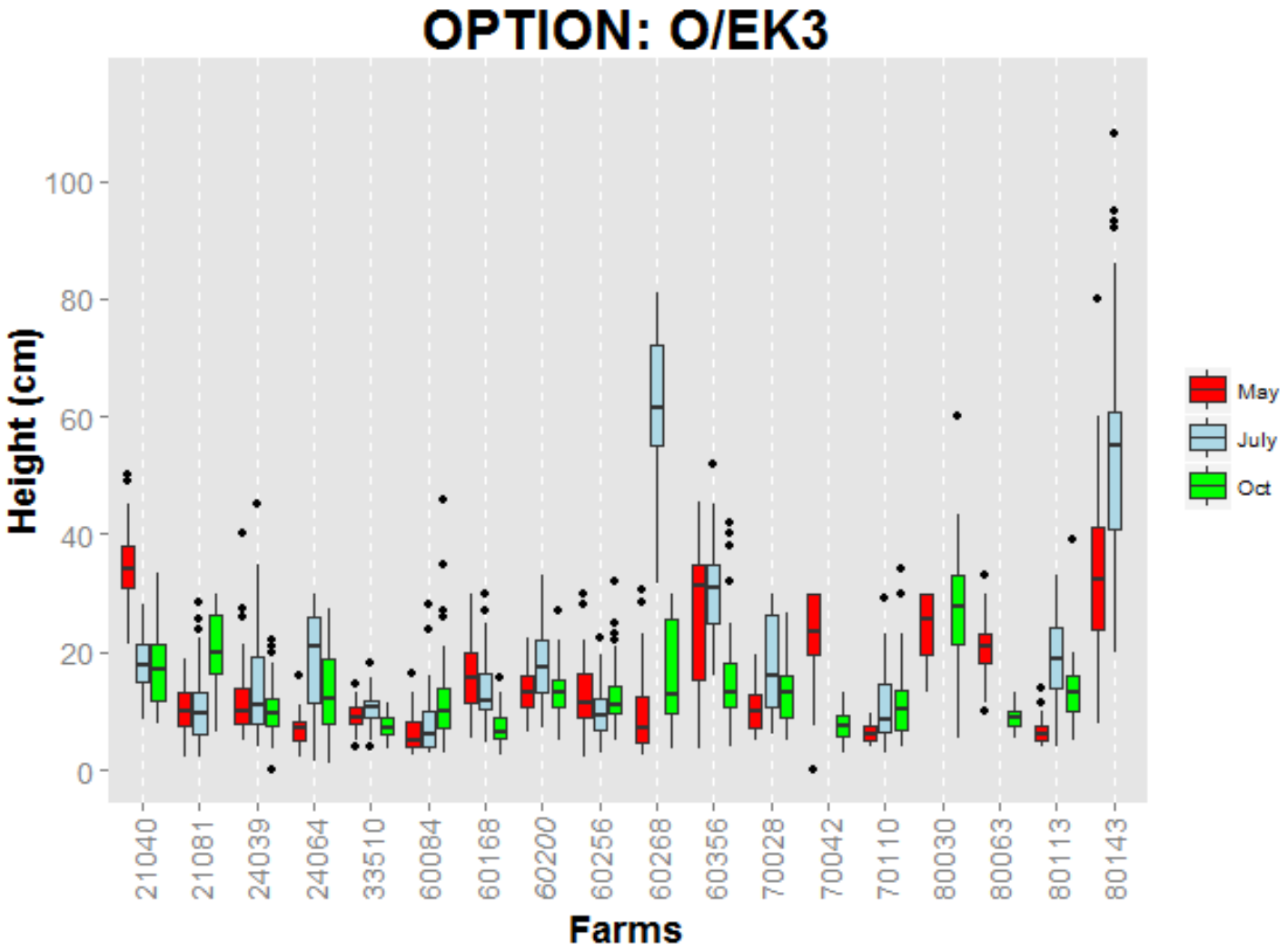


Figure 62. Variability in sward height measurements (using a HFRO sward stick) for fields in EK3.

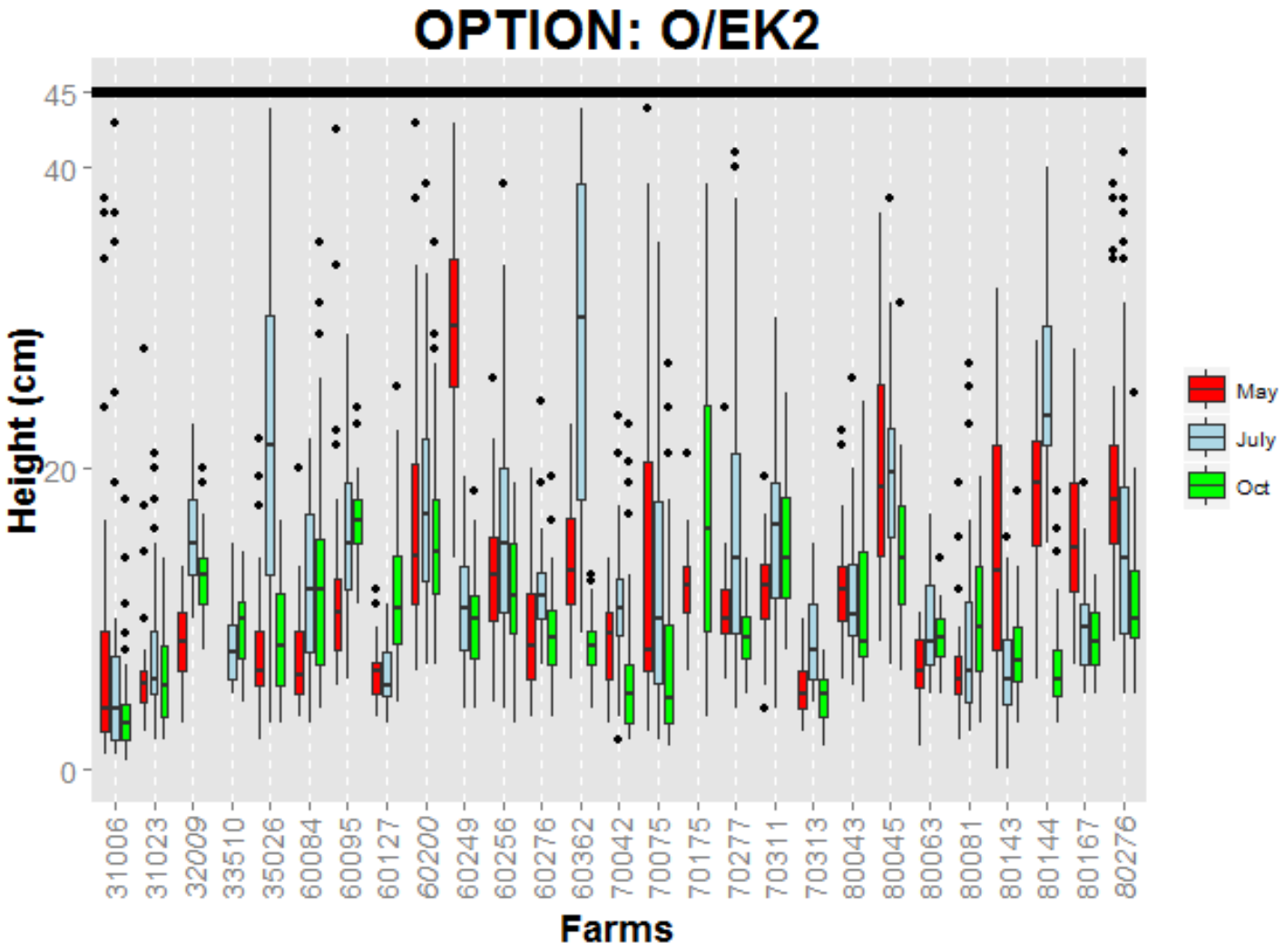


Figure 63. Variability in sward height measurements (using a HFRO sward stick) for fields in EK2; y axis restricted to 0 - 45 cm.

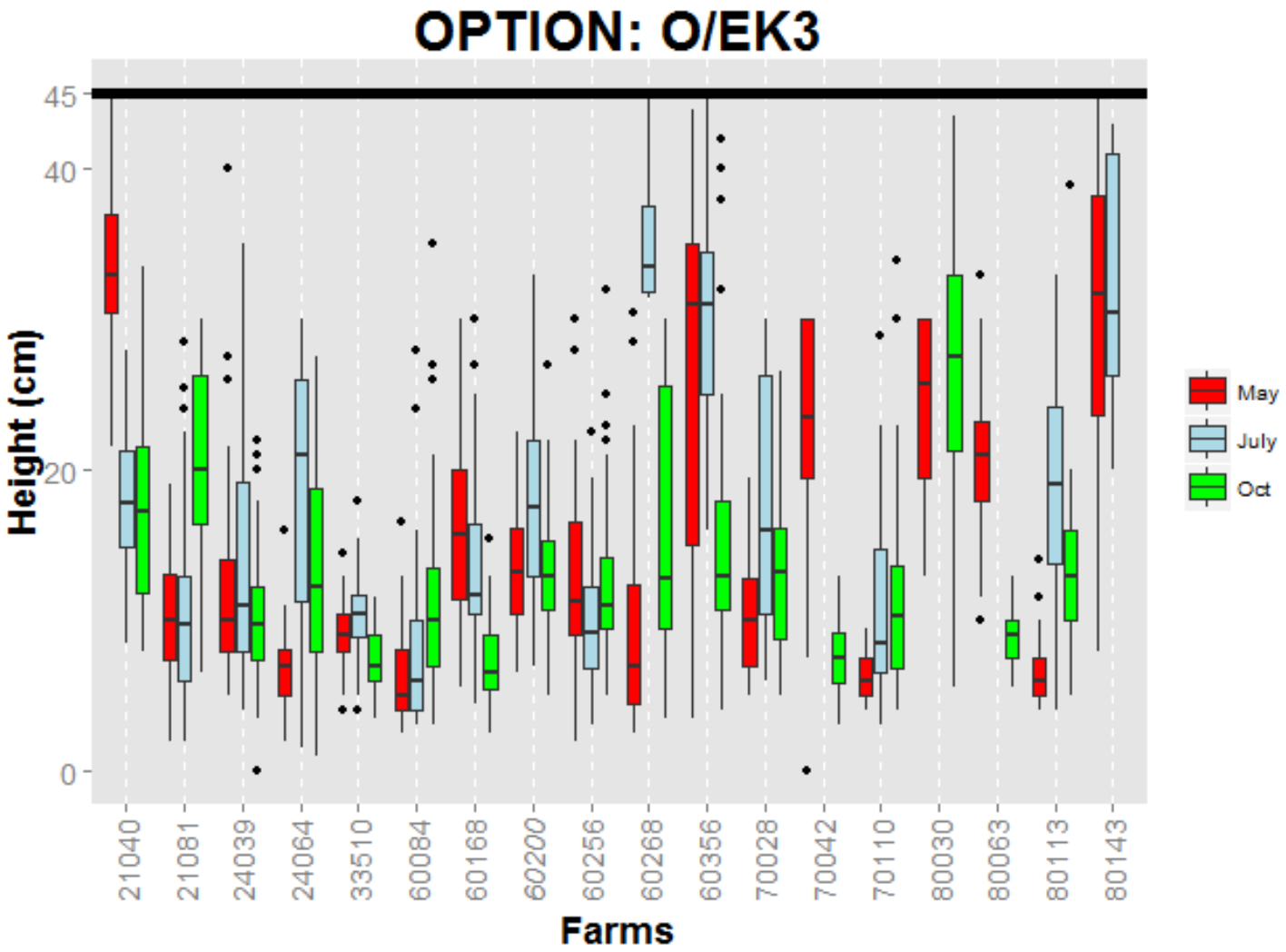


Figure 64. Variability in sward height measurements (using a HFRO sward stick) for fields in EK3; y axis restricted to 0 - 45 cm.

Table 143. Variance in sward height measurements (using a HFRO sward stick) and assessment of differences in variability between months.

Option	Site	Variance			df	F	p	
		May	July	October				
EK2	31006	180.2	304.6	13.7	2,117	2.89	0.060	ns
EK2	31023	19.6	20.7	8.7	2,117	0.98	0.378	ns
OK2	32009	6.2	10.1	8.0	2,117	0.88	0.417	ns
EK2[1]	33510		4.8	6.0	1,78	0.86	0.357	ns
EK2	35026	17.9	385.8	13.1	2,117	33.35	0.000	***
EK2	60084	11.8	29.7	52.9	2,117	6.12	0.003	**
EK2	60095	52.6	31.8	8.6	2,117	3.22	0.044	*
EK2	60127	3.6	5.0	21.1	2,117	12.82	0.000	***
OK2	60200	73.9	72.6	37.9	2,117	1.41	0.248	ns
EK2	60249	44.7	14.2	10.5	2,117	9.50	0.000	***
EK2	60256	19.5	71.9	15.8	2,117	9.75	0.000	***
EK2	60276	15.4	9.7	11.4	2,117	2.03	0.136	ns
EK2	60362	16.6	196.7	5.5	2,117	42.50	0.000	***
EK2	70042	6.7	18.0	26.8	2,117	1.35	0.265	ns
EK2	70075	290.7	229.4	43.0	2,117	4.38	0.015	*
EK2[1]	70175	7.6		131.5	1,78	33.63	0.000	***
EK2	70277	9.1	162.5	5.2	2,117	21.29	0.000	***
EK2	70311	9.8	41.5	18.6	2,117	9.86	0.000	***
EK2	70313	68.0	9.4	3.1	2,117	0.89	0.413	ns
EK2	80043	13.1	18.8	31.5	2,117	1.91	0.152	ns
EK2	80045	46.8	46.2	23.0	2,117	2.78	0.066	ns
EK2	80063	5.6	9.7	3.6	2,117	4.96	0.009	**
EK2	80081	11.5	43.1	20.8	2,117	3.68	0.028	*
EK2	80143	65.7	12.0	11.2	2,117	17.23	0.000	***
EK2	80144	25.2	56.9	12.4	2,117	6.97	0.001	**
EK2	80167	26.3	10.9	4.4	2,117	10.98	0.000	***
OK2	80276	112.0	196.2	18.4	2,117	6.08	0.003	**
EK3	21040	41.3	22.9	45.8	2,117	1.37	0.258	ns
EK3	21081	17.8	47.5	44.5	2,117	3.48	0.034	*
EK3	24039	50.7	103.8	23.8	2,117	4.07	0.020	*
EK3	24064	6.5	84.5	59.7	2,117	21.81	0.000	***
EK3	33510	5.1	8.0	3.6	2,117	1.14	0.322	ns
EK3	60084	9.0	28.8	81.7	2,117	5.26	0.006	**
EK3	60168	40.1	51.0	8.2	2,117	7.23	0.001	**
OK3	60200	15.2	37.7	22.2	2,117	4.09	0.019	*
EK3	60256	40.6	2196.5	31.8	2,117	43.95	0.000	***
EK3	60268	52.2	143.2	73.3	2,117	4.17	0.018	*
EK3	60356	123.5	58.2	81.4	2,117	3.75	0.026	*
EK3	70028	15.1	73.6	29.2	2,117	19.79	0.000	***
EK3[1]	70042	58.9		7.5	1,78	23.73	0.000	***
EK3	70110	2.4	40.0	44.7	2,117	9.60	0.000	***
EK3[1]	80030	29.1		114.8	1,78	10.02	0.002	**
EK3[1]	80063	25.1		3.9	1,78	17.84	0.000	***
EK3	80113	4.7	59.8	32.4	2,117	14.96	0.000	***
EK3[1]	80143	168.7	490.1		1,78	8.21	0.005	**

[1] No data available or missing data, therefore excluded from analysis, where cells are blank.

All fields that were not shut for a hay or silage cut at some point during the season were assessed against the ELS requirement to maintain a varied sward height, with at least 20% of the sward less than 7 cm and at least 20% greater than 7 cm. Numbers of fields meeting these requirements are presented in Table 144. In each of the months assessed fewer than half of fields met these requirements, but the proportion was lowest in July (Figure 65) and slightly lower for fields in O/EK3 compared to those in O/EK2. Almost all swards that did not meet the requirements were too tall rather than too short (Table 144).

Table 144. Number of fields meeting height requirements in each month surveyed.

	O/EK2			O/EK3			Total		
	May	**July**	**Oct**	**May**	**July**	**Oct**	**May**	**July**	**Oct**
Met requirements	13	11	13	7	4	7	20	15	20
Less than 20% of sward > 7 cm	0	0	2	0	0	0	0	0	2
Less than 20% of sward < 7 cm	14	16	12	11	12	11	25	28	23

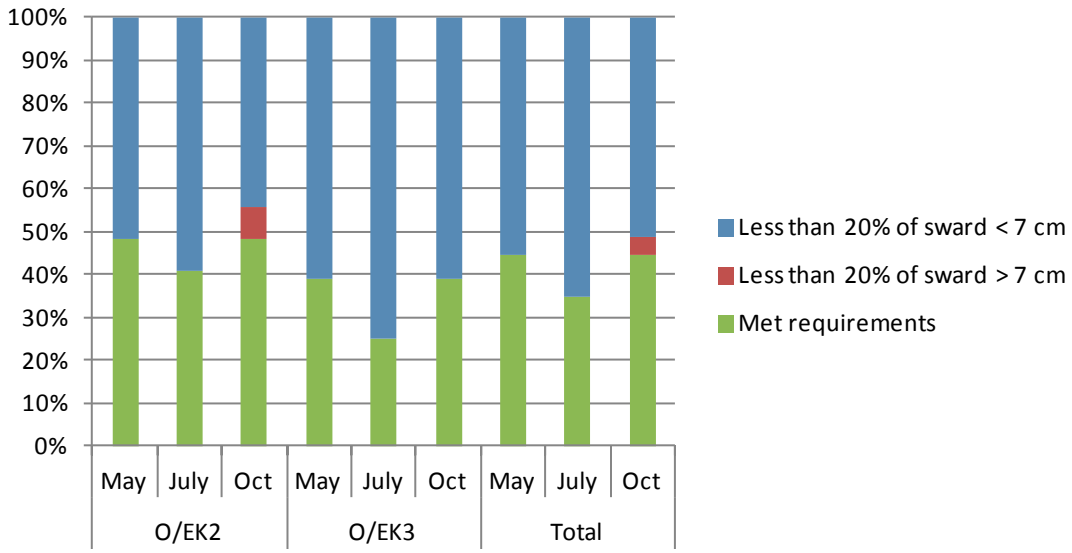


Figure 65. Percentage of fields meeting height requirements in each month.

For each field, the frequency of meeting the height requirements across the three months of assessment was calculated (Table 145). Overall 67% of fields met the requirements in at least one of the three months when assessments were made. The proportion was lower for O/EK3 (61%) compared to O/EK2 (70%) (Figure 66). A total of six fields met these requirements in all three months.

Table 145. Number of fields and frequency of meeting height requirements.

	O/EK2	O/EK3	Total
Never met requirements	8	7	15
Met requirements once	5	6	11
Met requirements twice	10	3	13
Met requirements three times	4	2	6
Total meeting requirements at least once	19	11	30

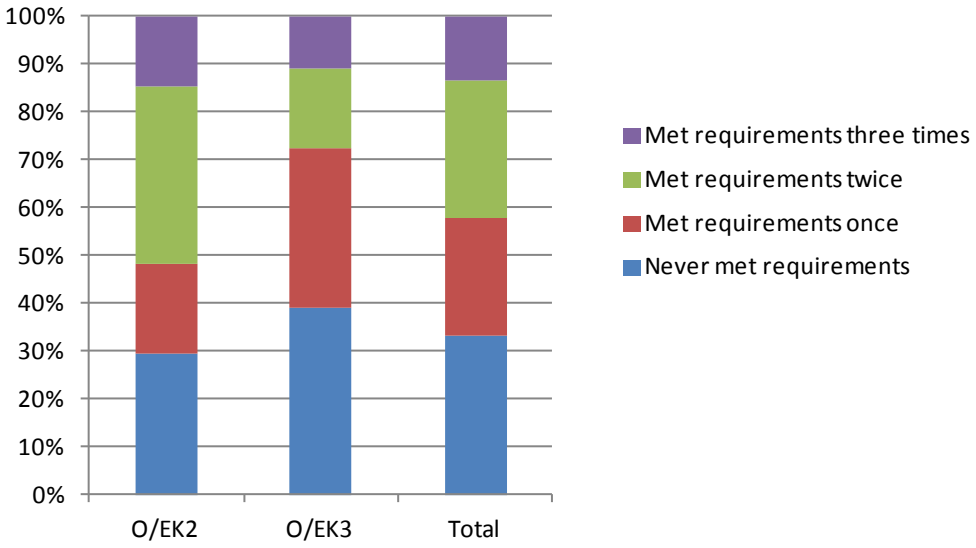


Figure 66. Percentage of fields under the two options meeting height requirements through the season.

Only two fields had been topped to control injurious weeds. The proportion of the field topped was estimated at 15% on an EK2 option and 95% on an OK2 option.

Percent cover of individual injurious or invasive non-native species, recorded in July was low (Table 146), although as a group these species represented 5% and 9% of cover in fields on average under EK2 and EK3 respectively. Creeping thistle and ragwort were recorded at 20% and 15% cover respectively on two different EK3 fields. There were few differences between options in the cover of injurious species, however cover of nettles and ragwort were greater on O/EK3 than O/EK2 fields. Cover of bare ground and dead vegetation was low (between 2.5 and 3.5%; Table 146). Number of seed heads was highly variable between fields (min. 1.5; max. 624 heads m^{-2}) but there was no significant difference between options.

Table 146. Cover of injurious species, bare ground and seed head counts for fields under O/EK2 and O/EK3.

Species/group	O/EK2			O/EK3		
	n	Mean	SEM	n	Mean	SEM
Broad-leaved dock	29	0.9	0.35	17	0.7	0.24
Curled dock	29	0.1	0.07	17	0.3	0.29
Creeping thistle	29	2.5	0.62	17	3.6	1.14
Spear thistle	29	0.6	0.17	17	0.8	0.31
Nettles	29	0.6	0.17	17	2.2	0.50
Ragwort	29	0.1	0.05	17	1.5	0.90
Bracken	29	0.1	0.05	17	0.1	0.06
Invasive non-natives	29	<0.1	0.03	17	0	
Total injurious/invasive	29	4.9	0.77	17	9.1	1.99
Bare ground	27	1.6	0.50	16	1.2	0.41
Dead vegetation	27	0.9	0.43	16	2.3	1.06
Bare/dead	27	2.5	0.86	16	3.5	1.34
[1]Seed heads m^{-2}	25	109	26.0	13	187	54.8

[1] Fields closed for cutting excluded

There was a significant relationship between sward height and the number of seed heads present ($p<0.001$; $r^2 = 37.5$) (Figure 67), with taller swards supporting higher densities of seed heads.

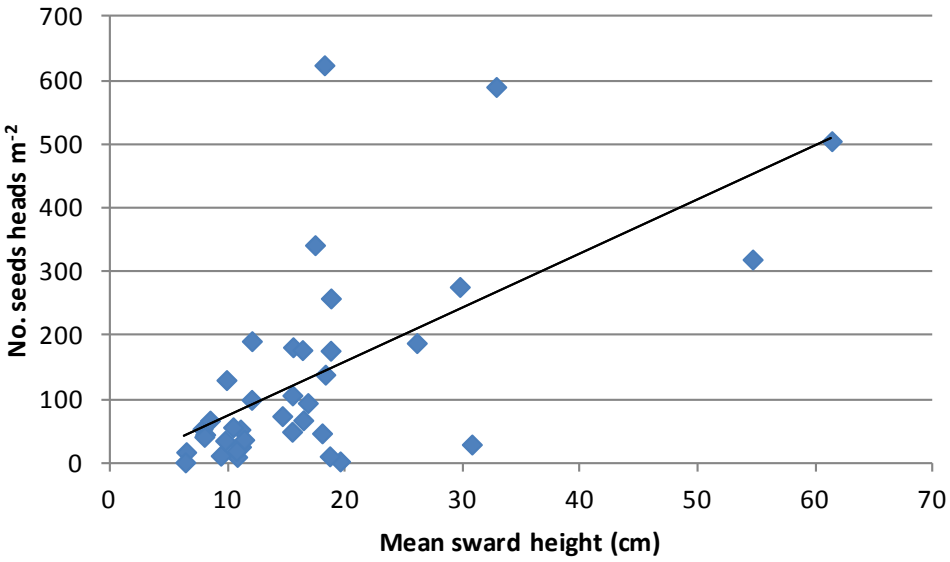


Figure 67. Relationship between sward height and number of seed heads present (July).

5 DISCUSSION

5.1 Farmer attitudes to the scheme

5.1.1 Overall attitudes to scheme

Of those farmers who were interviewed in both 2005 and 2011 (phase 1) there was a substantial increase in the number of respondents to the postal questionnaire who gave answers indicating that wildlife conservation benefits or the encouragement of environmentally sustainable farming were the most positive aspects of the scheme, and a decrease in those who cited financial incentives or the flexibility and ease of use of the scheme. This suggests that during the life of their agreements, agreement holders have become more likely to view their agreement in terms of the environmental benefits accruing than as a relatively easy way of enhancing their income. Similarly those in phase 2, interviewed only in 2011, considered wildlife habitat and biodiversity as the most positive aspects of the scheme. This group included farmers that had renewed an ES agreement and those that had no previous agreement, although the former category represented a much greater proportion of the population. Of this group, 62% thought that membership of the scheme had made them more positive about environmental protection/conservation, suggesting that ES is instrumental in raising awareness.

In 2005/6 over 40% thought there would be little or no impact of the scheme on the farming system; this decreased to around a quarter in 2011. Of the larger phase 2 group interviewed only in 2011, a quarter thought there would be no impact on the farming system, a further 21% thought impacts would be negligible and 24% thought there would be positive impacts of joining the scheme. However, 20% of non-participants who gave reasons for not joining ES thought that it would not fit with their current farming system, because of their farm size or type. There was a large increase in numbers of phase 1 farmers citing wildlife/environment/conservation benefits, up from around 11% in 2005/6 to more than a third of respondents in 2011. The number citing less intensive agriculture also doubled. Again, this highlights an increasing awareness of the environmental aspects of the scheme among agreement holders.

Around a third of phase 1 and nearly a quarter of phase 2 farmers did not cite any negative aspects of the scheme. Of those that did, there was a decrease between 2005 and 2011 in the proportion citing administrative issues, paperwork or bureaucracy. This could be because changes in the organisation of the scheme have led to smoother operation, or that agreement holders have become more familiar with the scheme and the necessary administrative processes. The only category showing a noticeable increase in respondents citing it as a negative aspect was hedge management issues (increased from two to eight), reflecting the challenges of managing hedges that are cut less frequently.

The great majority of agreement holders surveyed (3/4 in 2005/6, 4/5 in 2011 and 9/10 in phase 2) reported no difficulties with their agreement. Where difficulties were reported, these related to a range of issues including hedge and ditch management, timing of operations and weed control, weather conditions and changes to agreements, with no specific issues standing out as commonly experienced.

5.1.2 Scheme objectives

More agreement holders thought that (O)ELS was important for improving conditions for farmland wildlife at both national and farm level than other objectives, and when views changed, farmers were more likely to believe that (O)ELS was important for wildlife at both national and farm level in 2011 than in the baseline year 2005/6. At national level, those that changed their views were likely to ascribe less importance to landscape and historic objectives, but a roughly equal number thought water quality and soil protection were of greater or lesser importance. At farm level, slightly more respondents considered water and soil more important in 2011, and roughly equal numbers were more or less enthusiastic about landscape and historic objectives. Phase 2 farmers had similar views on environmental benefits, considering ES to have greatest impact for farmland wildlife, followed by water quality and soil erosion then landscape character. Furthermore, when asked what they thought were the most positive aspects of the scheme, more respondents mentioned wildlife conservation benefits in both years and in phase 2 than any other of the categories, with the number increasing over the period between surveys. The dominance of wildlife as the major beneficiary in the minds of agreement holders has not only persisted, but seems to have increased despite recent efforts by Natural England to place more emphasis than previously on other objectives such as resource protection. It may be that this relatively recent change in terms of option availability and advice provision has not yet had time to have an impact on the majority of agreement holders. However, when asked about the key environmental issues affecting agricultural land, resource protection and pollution was the most commonly cited factor by phase 2 farmers with and without agreements, therefore there may be further opportunities to encourage farmers to consider options which benefit resource protection in future.

Phase 2 farmers considered that ES would have least impact on climate change, with one third of respondents considering that the scheme would have no effect even at the national scale. This perhaps reflects the recent introduction of this as an objective or that farmers consider that the impact of farming on climate change is limited in comparison with other factors.

Interestingly, phase 2 farmers considered that ES would have a greater impact at the national level than on their holding for all objectives, but particularly for protecting the historic environment, presumably because many farmers had no historic features on their holding. Current agreements were viewed slightly more positively than previous agreements which may suggest that current agreements have been better targeted. Any differences between those that had received ETIP advice and those that had not in assessing the impact of ES were small, therefore improvements to agreements could be a result of farmers themselves being better informed, or of wider advice not delivered as part of ETIP.

5.1.3 Points and payments

In both years of the phase 1 survey and in phase 2, few respondents answered the question in the postal questionnaire about whether points for specific options were too high or too low, suggesting that in general agreement holders were content with points allocations. Agreement holders were asked at interview about the points allocations for option groups. In 2011 (phase 1 and 2) most thought that the points allocations were about right, although

nearly half of farmers in the phase 2 group that had not received ETIP advice considered the points allocation for arable options too low. The small numbers in phase 1 who changed their views were more or less equally distributed between those who had slightly more positive views and those who had slightly more negative views, though for grassland options, slightly more respondents changed their perception in a negative direction. This may reflect changes in prescriptions during the period, as agreement holders are now obliged to maintain swards within specific height ranges. However 89% of phase 2 farmers thought that the grassland points allocation was about right, and in general, agreement holders seem to be satisfied with points allocations. It would be interesting to carry out a further similar survey in future to see if this perception changes as a result of the adjustments in points allocations for some options resulting from the MESME programme, which were introduced in January 2013.

In 2011, three quarters of phase 1 farmers and 82% of phase 2 farmers responding to the postal questionnaire thought that payment rates would cover their costs. Similarly only 19% of non-participants indicated the payment rate as a reason for not joining ES. In 2005, many farmers were not clear about payment rates and there was an increase in the proportion of farmers that both thought payment rates would and would not cover their costs between 2005 and 2011 amongst phase 1 farmers. Of those who gave reasons why payments did not cover costs, these were most often related to the cost of field boundary maintenance or restoration, and for phase 2 farmers also issues with production and cost of seed mixtures..

5.1.4 Impacts on the farm business

Interviewees were questioned about the impact of different groups of options on their farm businesses. Most thought there would be no impact. In the phase 1 baseline survey, numbers who thought there would be positive and negative impacts were roughly balanced, but in 2011 numbers of phase 1 farmers who thought there would be positive impacts of boundary and grassland management substantially outweighed those who thought there would be negative effects. This was reinforced when considering changes in views of individuals; far more respondents became more positive in their views in relation to boundary and grassland options than became more negative. Similar to the 2005 survey, the number of phase 2 farmers who thought there would be positive and negative impacts on the farm business was balanced for all groups of options, except for soil and water for which the sample size was very small. Although there was a similar trend to the phase 1 results in 2011, with boundaries and grassland management more likely to have positive than negative impacts, the differences were very small for this group of farmers. There were few differences between those that had received ETIP advice and those that had not, but for boundary and historic & landscape options, ETIP farmers were more likely to consider that the options were having no effect and non-ETIP farmers were more likely to consider that options were having a negative effect on the farm business.

Those who elaborated with free text answers were most likely to cite positive or negative impacts on financial or management issues but some also mentioned effects on quality of features. Many such comments were positive, but where they were negative they were often related to untidiness or increased weed growth.

5.1.5 Conservation work outside the scheme

There was a substantial increase in phase 1 farmers reporting that they carried out conservation work outside the scheme between the baseline and 2011 surveys, from 34 to 59%. Similarly, 56% of participants and 59% of non-participants in phase 2 were undertaking conservation work outside ES. Tree planting/woodland management, hedge planting/management and pond/wetland creation/management were the most common types of activity delivered outside ES for farmer is phase 1, phase 2 and for non-participants. Most of these activities are, of course, absent from ES. In 2005, tree planting or woodland management were the dominant types of non-scheme conservation management, but in 2011 increases were seen in hedge planting and the maintenance and restoration, of hedges and other field boundaries, pond and wetland creation and maintenance, and the creation/management of a range of other habitats. The increase in hedgerow planting and restoration may be a reflection of the fact that hedge planting and gapping up are not supported under the entry-level strands of ES, whereas they were grant-aided under Countryside Stewardship (CS). Agreement holders transferring from CS were likely to have carried out these activities under the former scheme (as indicated by answers to the question about management prior to entering (O)ELS). Increases in some other habitat management/creation may also reflect a resumption of activities formerly supported under previous agri-environment schemes. The fact that in most cases these are activities taken up during the life of the agreement is emphasized by the small numbers of matches in answers between the earlier and later surveys.

5.1.6 Advice

Phase 1 postal responses indicated that fewer respondents had taken advice when they renewed their agreement than for their original agreement, probably because they were more familiar with the process second time round. Although more than half of the 90 ‘core sample’ that replied to the postal questionnaire indicated that they had had one-to-one advice in 2005/6, and many of these said they had received advice from Natural England, it is probable that this was received over the telephone or at an event, as on-farm advice was not provided by Natural England at this time for entry-level strands of ES. In both years more than three quarters of those receiving advice thought it was very useful, and only two in 2005/6, and none in 2011, thought it was not useful. Most individuals did not change their views on the usefulness of advice between the two surveys, but where views did alter, there were similar numbers of changes in positive and negative directions.

Phase 2 farmers were asked about the provision of advice for each option at interview. Option specific advice was more likely to have been sought on ETIP farms (34% of options) than non-ETIP farms (18%) suggesting that farmers took the opportunity to ask for advice when it was freely available through the ETIP scheme. ETIP farmers were more likely to have found it very easy to access advice and to have found the advice very useful than non-ETIP farmers, suggesting that ETIP provides an easily accessible route for quality advice. Overall, farmers were most likely to seek advice for historic and landscape options, perhaps because farmers consider themselves to be less familiar with the appropriate management for these types of options.

There was little evidence that provision of ETIP advice had had much impact on the choice of options. However, farmers obtained advice from a wide range of sources and Jones *et al*. (2013) recorded that agronomists/independent consultants and ES meetings/farm walks were important non-ETIP sources of advice and suggested that the ETIP message would have diffused through alternative providers of advice. Phase 2 farmers asked about differences between original and current agreement were equally likely to have dropped priority options and included new priority options whether they had received ETIP advice or not. This reflects results from the project reported by Jones *et al*. (2013), which analysed the increase in the proportion of points in agreements which were for priority options. An analysis of 5119 farmers, found that there was a significant difference in the increase in priority option points between those that had received ETIP advice and those that had not. However, differences between the groups were small (3%) and this analysis related to phase 3 of the ETIP programme, when the quality of advice had improved from earlier phases. For the current ES evaluation it was not known which phase of ETIP advice the ETIP group received. Given these considerations and the small sample size, it is not surprising that there is limited evidence of positive benefits of ETIP advice in this study. Further discussion of this topic is included below (section 5.3)

5.2 Additionality and continuity

In general, a majority of agreement holders said that they would have carried out the option management even if they were not in the scheme, and would continue if they left the scheme. These answers imply that the scheme is buying relatively little change, and is largely supporting existing management. This is in line with scheme policy, and it is quite possible that changes in farm economics could lead to unanticipated changes, for example an increase in crop prices could encourage farmers to plough out habitats created under ES after the expiry of their agreement, even if they said they would not. Several phase 2 farmers indicated that this was a difficult question to answer because it was affected by a range of factors, some of which are unpredictable. Furthermore, monitoring data indicate that not all agreement holders were managing options correctly according to the prescription, so in some cases they may not fully understand what the option management entails. There is also scope for possible misinterpretation, for example, a respondent may mean that he/she cut his hedges prior to having an agreement, or would continue to cut them even if not in an agreement, rather than that he/she did or would cut them according the option prescription. This particular possibility is reinforced by answers to a specific question about frequency of hedge cutting (see below), and the same caveat may apply in the case of other options. Therefore, the actual level of additionality may be greater than indicated. Nevertheless, overall the responses suggest that the conclusion reached in the initial evaluation, i.e. farmers choose options that they are already doing or are easy to do within their existing system, has not changed, and this is supported by data from other ongoing projects[15].

Phase 2 farmers indicated that 61% of the options in the ES agreement involved no change in management, however where features were present on the farm that were also managed

[15] E.g. farmer survey undertaken in "ELS Training and Information Programme (ETIP) Value for Money Analysis" project (Jones *et al*., 2013).

outside the scheme, results suggest that nearly half of all features outside ES are managed differently. Least change was required for historic & landscape options (83% of options were managed in the same way) and trees & woodland (81%). Most change was required for arable options (only 37% required no change) and buffer strips (48%). Very similar proportions of phase 1 farmers indicated that they would continue with option management of these features even if the option was not included in the ES agreement. Phase 2 farmers were also asked whether the management of similar features that were not in ES options was different from features that were in ES. Generally similar proportions of farmers were managing ES and non-ES features in the same way as the proportion that indicated that the prescribed management would have been carried out even if they had not chosen the option. Grasslands were the exception: 67% indicated that management of the feature would have remained unchanged, whereas only 38% indicated that grasslands outside ES were managed in the same way as those in ES. Many farmers will have a range of grassland types on the holding and grasslands entered into ES are likely to be those that already receive little or no fertiliser. This is supported by results from the phase 1 field survey which indicate that grassland in the options for permanent pasture with low or very low fertiliser were more likely to be semi-improved or species-rich (as compared to improved) than those on the same farm that were not in the scheme.

5.3 Quality of agreements and implementation

The scoring system applied to priority options provided a quantitative assessment of the value of agreements for specific environmental themes, allowed comparisons to be made of agreements inside and outside priority areas, and also allowed agreements that had received ETIP advice to be compared with those that had not. Scores were calculated on the basis of a range of attributes, and examination of these individual attributes provided further information on where options were performing well or not so well.

There were no significant differences in weighted scores between agreements within or outside priority areas for any of the environmental themes examined, nor were there any significant differences in points ratios, which provide a measure of take-up of priority options. This indicates that, at the time the evaluation was carried out, the quality of agreements in terms of both uptake and implementation of options was similar within and outside priority areas.

Statistically significant differences in weighted agreement scores with respect to the receipt of ETIP advice were found in two cases only: for butterflies, bees and vulnerable grassland, and for ground water. In both cases, scores were higher for those that had not received advice. For butterflies, bees and vulnerable grassland, the evidence indicated that the difference in scores was primarily due to the fact that farms in this study that had not received ETIP advice had more grassland with very low inputs (EK3) in their agreements on average. Unweighted scores were similar, indicating little difference in quality of the options between the two categories. Thus, taken at face value, this result implies that ETIP advisers were discouraging uptake of EK3. It is possible that this result was simply an artefact, though at a probability of 13 in 1,000, the chances of this occurring appear low. EK3 is a popular option and it is possible that advisers may have encouraged farmers to take up less popular options instead of EK3. However, evidence from a study in which uptake data from a much larger sample of agreements was analysed suggests that this was not the case.

Jones *et al*. (2013) found that uptake of EK3 increased when agreements were renewed, and this increase was slightly greater for agreements receiving ETIP advice than for those not receiving advice, though the difference was not statistically significant. As our study involved field visits, the sample size was necessarily low and may not have been fully representative of the whole population. In terms of uptake, the Jones *et al* (2013) study is likely to give a better indication of what is happening at the whole population level.

For ground water, a similar result was seen, with weighted scores and points ratios both being higher for non-ETIP agreements. In contrast, Jones *et al* (2013) found that agreement holders receiving advice had a 2.1% higher increase on average in the proportion of "cleaner water and healthier soils" priority points, the difference being statistically significant. However, they did not break this down into sub-themes.

Although Jones *et al*. (2013) found positive effects of ETIP, except for farmland birds, the average increase in priority points was only 3% higher for those receiving ETIP advice than for those not receiving it. Furthermore, the remit of ETIP advisers is restricted to influencing option uptake, but our results indicate that there could be benefits from provision of advice on option management also.

There was a lot of variation in unweighted scores (reflecting perceived environmental value) for individual options, but average scores were often considerably less than the maximum possible, indicating that there is scope for improvement. Although some of the attributes included in the scoring system related to elements of the prescription, other attributes were selected because they were considered to be related to the outcome for the environmental theme under consideration. Attributes that were not highlighted in the prescription, are unlikely to have been consciously influenced by management on behalf of the agreement holder, so awareness of these would need to be raised in order to improve performance. In addition, a number of instances were identified where agreement holders were not following prescriptions fully, and these are areas where advice on management could be targeted in future.

5.4 Management of specific habitats

5.4.1 Boundary features

Despite the large proportion of interviewees who indicated that they were already carrying out the prescribed management of boundary features, when questioned specifically about the frequency of hedge cutting, there was a clear shift towards less frequent cutting in phase 1 and in some cases hedges were cut less frequently than the minimum interval stipulated in the prescription. Results from phase 2 indicated that some farmers changed from EB3 to EB1 when renewing their agreement because of the cutting frequency restrictions and some farmers had dropped hedgerow options in their second agreement in order to return to an annual cut, although half of these were roadside hedges that can no longer be included if they need to be cut annually for public safety reasons. However, similar to phase 1, new options in renewed agreements included farmers who had reduced the frequency of cutting to meet the option prescription. Where hedges both in and out of ES were present on a farm, the most frequent difference in management was that those not in ES were cut annually. Overall therefore, more change in management has taken place as a result of ES than is evident from farmers' overall assessment.

Most phase 1 hedges increased in height, and mean width also increased between 2005/6 and 2011. Phase 1 control hedges (i.e. those not in options) on farms with (O)ELS agreements were on average higher and wider than those in options. This may seem counter-intuitive, but it is probable that farmers were leaving out of the scheme those hedgerows that were inaccessible for management, had already been allowed to grow too high to be easily brought back into management, or which farmers did not wish to bring into a regular cutting management programme. However, data from phase 2 indicated no significant difference in width for EB1, 2 or 3 and on-farm control hedges, although EB3 hedges were taller than on-farm controls. Comparisons of option hedges and features on non-participant (NP) farms indicated no difference between NP hedges and EB1 or 2 features, but EB3 hedges were both taller and wider than NP features. Comparison with non-participant farms probably provide a better assessment of features in and out of scheme because NP features will be more representative of features on the holding rather than a subset of features that were excluded from ES for whatever reason.

There is no requirement to replant gaps in hedgerows in the (O)ELS prescriptions, and the number of phase 1 agreement holders who said that they normally repair gaps in hedgerows declined between the two surveys. This could be because gapping up was previously grant-aided under Countryside Stewardship, and some of those in the baseline survey could have had CS agreements which included gapping up. However, field data showed a small average increase in the percentage of gaps, but there was little overall change in the percentage of hedges with gaps greater than five metres wide. There was also little difference between control and option hedges in the percentage of hedge length composed of gaps, except that there were more control hedges with greater than 20% of the hedge length composed of gaps. Thus it seems that the scheme had little impact on the occurrence of gaps or amount of gaps in hedgerows. Phase 2 on-farm control hedgerows had a greater proportion of gaps than EB2 and EB3 features, suggesting that, either hedges with a significant proportion of gaps are not entered into ES or that those in ES are better maintained. The fact that there were no differences between option and non-participant hedges, suggests that farmers are selectively entering hedges into ES that have fewer gaps.

With a few exceptions, interview data indicated that phase 1 agreement holders were following prescriptions for ditch management in 2011. However, a significant minority of phase 2 farmers were cleaning out ditches too frequently, at an inappropriate time of year and were spreading dredging on the bank. There was a slight decrease in species richness of phase 1 ditches between the baseline survey and the 2011 survey, but little change in the presence of submerged, floating or emergent vegetation. Thus there is no evidence of an improvement in ditch quality as measured by vegetation-based assessments, although five years is a relatively short time in terms of vegetation changes, therefore an absence of significant changes in species numbers or presence of aquatic vegetation is not surprising.

Agreement holders with stone walls in option EB11 are obliged to protect these walls from deterioration, and repair gaps that appear during the agreement. In 2011, only one phase 2 farmer asked about stone walls said that they did not repair their stone walls, nevertheless, there was some evidence of slight deterioration in some walls in agreements between 2005 and 2011.

5.4.2 Trees and woodlands

Results for in-field trees and woodland fences and edges indicated that in a number of cases, prescriptions were not being followed. Fallen timber appeared to have been removed from beneath in-field trees during agreements. Although only one phase 1 interviewee admitted to removing fallen timber in 2011, nearly half of those interviewed for phase 2 removed fallen wood from underneath the tree canopy. Cultivation was recorded beneath the majority of trees in arable fields assessed in phase 1 and for over half of those assessed for phase 2. It should of course be remembered that the phase 1 2011 survey would have been carried out after some original agreements had expired, and in some cases it is possible that they had not been re-entered into a renewed agreement, nevertheless, the level of instances of non-compliance in phase 2 indicates that this is a cause for concern.

Although all but one woodland fences not considered stockproof in 2005/6 appeared to have been repaired, more than ten percent of phase 1 woodland fences in option EC3 were recorded as not being stockproof in 2011, and evidence of grazing was recorded in four out of 51 woodlands with this option. Again, these instances of apparent non-compliance are a cause for concern.

5.4.3 Buffer strips

Most buffer strips on arable land assessed in phase 2 had been established for the ES agreement and for most elements were managed in accordance with the prescriptions. However, nearly half were cut too frequently, suggesting that farmers do not understand the prescriptions or simply do not like to cut less frequently, presumably because of concern over potential weed problems and encroachment of woody species. More positively, half of those interviewed indicated that arable buffer strips had been positioned to reduce soil erosion, reflecting the concerns expressed about resource protection (one of the key environmental issues on farmland) and the fact that buffer strips were considered to have 'a lot of benefit' for resource protection by more than half of farmers.

There were few differences between arable buffer strips in ES options and on non-participant farms. NP buffers tended to be wider than EE1 features and the latter were less likely to be used for vehicle access than NP, EE2 or EE3 features, presumably because they were usually too narrow. Nearly half of other arable buffer features (including NP) were occasionally used for access, which is permitted under ES. It is perhaps surprising that a greater proportion of NP features were not used for access since this is likely to be a major benefit of margins, however the only record of severe vehicle use was recorded on a NP feature.

Agreements started after 2010 should identify any 6 m buffer strips adjacent to watercourses as the new EE9 and 10 options. However, many farms with EE3 had examples of these features adjacent to watercourses, indicating that they had not followed the new guidelines. Perhaps of greatest concern is that those farmers that had received ETIP advice were equally likely as those that had not to include 6 m buffers adjacent to water as EE3. ETIP advice would be expected to improve the selection and location of appropriate options, but this does not appear to have occurred for EE9.

5.4.4 Grassland options

In contrast to the tree and woodland options, there was evidence of an improvement in the average condition of fields in option ED5 (archaeological features on grassland). Interview data from both phase 1 and 2 indicated that most agreement holders were following prescriptions for options EK2 and EK3 (permanent grassland with low or very low fertiliser input respectively) with respect to inorganic fertiliser and organic manure application. Comparison of phase 1 fields in options with control fields in 2011 indicated that swards entered into options were more likely to be semi-improved or species rich than control fields. There were no significant differences in phase 2 between low input grassland options and on-farm controls, except that sward heights were greater for EK3. Comparisons with grassland on non-participant farms however indicate that fields in EK3 were more species rich and swards were taller than those in EK2, but NP fields were intermediate. This suggests that farmers enter less intensively managed fields into EK3, though interviews indicated that this often occurs for both EK2 and EK3, with historically less intensively managed, or difficult to manage (steep slopes, many in-field trees) fields included in both options. However, despite differences noted, the general similarity of on-farm controls and grassland on non-participant farms to features under ES options indicates that fields of similar biodiversity value to those in ES, remain outside agri-environment schemes.

Guidance for farmers on maintaining a varied sward structure under grassland options is intended to be of particular value to insects. Selective moderate and seasonal grazing promote heterogeneity of sward structure, which increases insect diversity compared to swards with a homogeneous structure (Vickery *et al*., 2001), though tall swards generally support the greatest numbers and diversity of invertebrates (Morris, 2000). Sward height is also important for foraging birds. Species that feed on soil-dwelling invertebrates prefer short swards, which those that feed on sward-dwelling invertebrates or seed select taller swards with greater spatial heterogeneity (Buckingham *et al.,* 2006). Tall swards have greater numbers of grass seed heads (Perkins *et al*., 2000), as well as herbivorous invertebrates, but Buckingham *et al.* (2006) found that most bird species preferred intermediate sward heights, and suggested that the tallest swards impeded foraging efficiency. In general therefore, swards with a heterogeneous structure of intermediate height are likely to provide the best balance in terms of invertebrate abundance, diversity and foraging opportunities for the greatest range of bird species.

Assessment of grassland height for fields in O/EK2 and O/EK3 options indicated that, on about one third of fields, the requirements were not being met. The results also represent only a subset of fields under these options because farmers were asked to identify fields which would be grazed. Some farms with fields under these options were excluded from these assessments because fields were never grazed, although it is likely that these would represent only a small proportion of the overall area under these options. Swards were often variable in height, however many tended to be too tall to meet the requirement for 20% of the sward below 7 cm, suggesting that grazing intensity was too light. It is likely that, particularly for EK3, farmers enter their least intensively managed fields, which may explain the relative lack of grazing pressure. In addition, unlike most elements of ELS option prescriptions, the requirement to maintain a heterogeneous sward through grazing is not defined by specific actions, but requires some input from the farmer in how to manage the sward. Because of this, farmers may give this aspect of the prescription less consideration

than other elements. Swards that are higher than optimum are likely to be preferable to those that are too low in that they will allow seed head formation and promote higher invertebrate abundance and diversity, but foraging opportunities for birds may be limited. Buckingham *et al*. (2006) found that patchy bare ground was a better predictor of sward accessibility to foraging birds than sward height heterogeneity, suggesting that any increase in grazing intensity or other management that opens up the sward will increase the ability of birds to utilise the foraging resources available within the sward.

5.5 Conclusions

In conclusion, most agreement holders appeared to be happy with the scheme, and recognition of the environmental benefits appears to have increased during the life of the first tranche of agreements, with less emphasis placed on financial benefits. When advice was taken, it was generally found to be helpful, though numbers taking advice were lower for renewals than for initial agreements. However there is some question as to how much additionality was achieved through the first tranche of agreements in comparison with the counterfactual, and whilst positive change was seen in hedgerows and grassland overlying archaeological features, little change was recorded for some other options and in some cases there was evidence of detrimental changes arising from non-compliance.

Results from Phase 2 indicate that although changes in management are (for some features) apparently limited, there is an important change in farmers' attitudes to environmental protection/conservation. Also, the general question about change in management does not necessarily reflect what actually happens: results from field assessments suggest that there is much more change than indicated based on interview data.

There appear to be certain elements of some prescriptions that are regularly not implemented correctly, either because agreement holders find them difficult, or in some cases because they are not aware (or forget) that they exist. Examples are the removal of wood from beneath fallen trees, buffer strip cutting frequency. Cutting nectar flower mixes. Often these are procedures that require most change from usual practice.

This study was carried out when ETIP advice had only been available for a relatively short time. The indications are that so far ETIP has not had a large impact, nevertheless farmers seem to appreciate that it is available and as both applicants and advisers become more used to the process, its influence may increase. The evidence collected here suggests that, not only is there scope for improvement in the impact of advice on option choice, but that advice on option management would also be beneficial, to ensure that options are implemented appropriately (e.g. with regard to location) and that agreement holders are aware of the key elements of the prescription that need to be followed.

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APPENDIX 1 SCORING SYSTEM

Selection of options and attributes

The priority options identified by Natural England with respect to the four key themes that are spatially targeted are shown in Table 147. Important attributes of habitat location and condition for the key options for the themes are given in Table 2 *et seq*., along with associated criteria for acceptability. Brown hare is not included in the farm wildlife section as there are no well defined characteristics of individual options that benefit them; rather, they benefit from presence of a diversity of vegetation types that provide food and shelter throughout the year.

Table 147. Priority lowland options for key themes identified in NE guidance.

ELS Option Code	Description (ELS options - OELS may differ)	Farmland birds			Farmland wildlife					Resource protection			Historic environment		
		in-field nesting	over-winter seed	insect-rich foraging	water voles, dragonflies, newts and toads	arable plants	bats & dormice	butter-flies bees grassland	brown hare	tackle the source	slow the pathway	protect the receptor	Arch. under cult	Arch. under grass	Traditional farm buildings
EB01	Hedge management both sides														
EB02	Hedge management one side														
EB03	Enhanced hedge management						■	■							
EB04	Stone faced hedge bank mgmt both sides														
EB05	Stone faced hedge bank mgmt one side														
EB06	Ditch management				■										
EB07	Half ditch management				■										
EB08	Combined hedge / ditch mgmt (inc EB1)														
EB09	Combined hedge / ditch mgmt (inc EB2)														
EB10	Combined hedge / ditch mgmt (inc EB3)														
EB11	Stone wall protection and maintenance														
EB12	Earth bank management on both sides														
EB13	Earth bank management on one side														
EC01	Protection of in-field trees on arable land														
EC02	Protection of in-field trees on grassland														
EC03	Maintenance of woodland fences						■								
EC04	Management of woodland edges						■	■	■						
EC23	Establishment hedgerow trees by tagging						■								
EC24	Hedge tree buffer strips on cultivated land						■								
EC25	Hedgerow tree buffer strips on grassland						■								

ED01	Maintenance traditional farm buildings														
ED02	Take out of cultivation arch. features														
ED03	Non-inversion cultivation on arch features														
ED04	Management scrub on arch. sites														
ED05	Management arch. features on grassland														
EE01	2m buffer strips on cultivated land														
EE02	4m buffer strips on cultivated land														
EE03	6m buffer strips on cultivated land														
EE04	2m buffer strips on intensive grassland														
EE05	4m buffer strips on intensive grassland														
EE06	6m buffer strips on intensive grassland														
EE07	Buffering in-field ponds in grassland														
EE08	Buffering in-field ponds in arable land														
EE09	6m buffers on cult. land next to water														
EE10	6m buffers on grassland next to water														
EF01	Management of field corners														
EF02	Wild bird seed mixture														
EF04	Nectar flower mixture														
EF06	Over-wintered stubble														
EF07	Beetle banks														
EF08	Skylark plots														
EF09	Unfertilised cereal headlands														
EF10	Unharvested cereal headlands														
EF11	Uncropped cult. margins for rare plants														
EF13	Uncropped cult. areas for nesting birds														
EF15	Reduced herbicide cereals then stubble														
EF22	Extended overwinter stubble														
EG01	Undersown spring cereals														
EG04	Cereals for whole crop silage then stubble														
EJ02	Mgmt maize crops to reduce soil erosion														
EJ05	In-field grass areas to prevent erosion														
EJ09	12m buffers for watercourses on cult. land														
EJ10	Enhanced maize mgmt to reduce erosion														

EJ11	Maintenance of watercourse fencing														
EJ13	Winter cover crops														
EK01	Take field corners out of management														
EK02	Permanent grassland with low inputs														
EK03	Permanent grassland with very low inputs														
EK04	Management of rush pastures														
EK05	Mixed stocking														

Table 148. Key attributes for farmland bird options[1] (plus CFE equivalents where applicable[2]). Criteria assessed by interview in italics.

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
In-field nesting				
EF8/OF8 Skylark plots (CFE C4) √	Crop	Winter cereal	Density	Min 2/ha
	Field size	>5ha	Weed cover	>10 but <60%
	Distance from woodland or tree lines in field boundary	At least 80% > 100m from woodland or	Width	Min 3m
	Distance from field boundary	At least 80% > 50m from field boundary	Area	Min 16m^2
	Distance from tramlines	Not touching tramlines	*Time of establishment*	*Before December*
EF13/OF13 Uncropped areas for ground-nesting birds (CFE C5) √	Field size	>5ha	Area	Min 1ha, max 2.5ha
	% field boundary composed of woodland or tree lines	Absent as adjacent feature	Width	Min 100m
	Distance from woods, trees, power lines, PROWs	Min 100m	Undesirable weeds[3]	Low level (<10% cover)
	Slope	Flat or slight slope	Vegetation cover	<60%
	Adjacent habitat (same or next field)	Extensively grazed grassland	Time of cultivation	*Between 1 Feb & 20 Mar*
	Erosion risk	Avoid fields at risk		
EF22 Extended overwinter stubbles (CFE C6) √	Preceding crop	Combinable crop, not maize	Desirable plant spp[4]	>5% cover
	Field size	Min 2ha	Broadleaved weed cover[5]	10% or more cover in stubble
	Erosion risk	Avoid fields at risk	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*
			Compaction removed?	*yes*
			Herbicide use	Not before 1 August
			Seed/nectar crop	yes

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
Overwinter seed				
EF2/OF2 Wild bird seed mixture √	Location in field	At field edge	Crop types	min 3 from list in ELS handbook, no maize, giant sorghum or sweet clover
	Total area in agreement	Max 3/100ha	No. crop types	Min 3 small seed-bearing crops (including those in handbook)[16]
			Area	Min 0.4ha, max 2ha
			Width	Min 6m
			%cover sown crops	>50% late summer/autumn
			%cover sown crops	>70% late summer/ autumn
			Seed production	>40% sown crop plants flowering/seeding
			Seed production	>80% sown crop plants flowering/seeding
EF6/OF6 Overwintered stubble (CFE C7a)√	Preceding crop	Combinable (cereal, rape, linseed, field beans etc), not maize	Desirable plant spp[4]	>10% cover in stubble, evidence of seeding
	Erosion risk	Avoid fields at risk	Broadleaved weed cover[5]	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*
			Compaction removed?	*yes*

[16] Also setaria, phalaris, buckwheat, cockspur, chicory.

Option	Location		Condition	
	Attribute	Criteria	Attribute	Criteria
EG4/OG4 Cereals for whole crop silage followed by overwinter stubble (NB none in sample)				
Insect-rich foraging habitats				
EF9 Unfertilised headlands within cereal fields √	Adjacent habitat	buffer strip, stubble, wild bird seed mix, nectar mix	Width	Min 3m (can be up to 6m)
			Desirable plant spp[4]	5% or more cover (summer)
			Broadleaved weed cover[5]	10% or more cover (summer)
			Undesirable weeds[3]	<10% cover (summer)
			Insecticide use	*None after 15 March*
			Herbicide	*Only permitted herbicides*
			Herbicide	*No broadleaved herbicide*
EF10 Unharvested headlands within cereal fields (CFE C11) √	Location in field	Edge of cereal field (not scored)	Width	Min 6m (can be up to 24m)
	Adjacent habitat	buffer strip, stubble, wild bird seed mix, nectar mix	Desirable plant spp[4]	5% or more cover (summer)
			Broadleaved weed cover[5]	10% or more cover (summer)
			Undesirable weeds[3]	<10% cover (summer)
			Insecticide use	*None after 15 March*
			Herbicide	*Only permitted herbicides*
			Herbicide	*No broadleaved herbicide*
EF11/OF11 Uncropped margins for rare plants on arable land (CFE C8)√	Soil type	Sandy, shallow, chalky, stony	Width	Min 3m (can be up to 6m)
	Erosion risk	Avoid fields at risk	Undesirable weeds (different from other options) [6]	<20% cover
			Desirable plant spp[4]	>20% 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)*

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
EF15 Reduced herbicide cereals followed by overwintered stubbles	Crop type	Cereal, not maize	Desirable plant spp[4]	5% or more cover (summer)
	Erosion risk	Avoid fields at risk	Broadleaved weed cover[5]	10% or more cover (summer)
	Soil type	Light (Sandy, shallow, chalky, stony)	Undesirable weeds[3]	<10% cover (summer)
			Insecticide use	*None after 15 March*
			Herbicide in crop	*Only permitted herbicides*
			Herbicide in crop	*No broadleaved herbicide*
			Desirable plant spp[4]	>10% cover in stubble, evidence of seeding
			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*
			Compaction removed?	*yes*
EG1/OG1 Undersown spring cereals	(None applicable)		Crop type	Spring cereal, not maize
			Grass	>10% cover (summer)
			Legume	>1% cover (summer)
			Desirable annual plant spp[4]	>10% cover (summer)
			Undesirable weeds[3]	<10% cover (summer)

[1] Attributes not related to theme are shown with grey background These will not be included in the scores for this theme.
[2] Attributes relevant to ELS only or with different criteria to CFE are shown with pale blue background . These will be omitted or modified when comparing scores.
[3] Cleavers, grass weeds except annual meadow grass.
[4] Fat hen, chickweed, Polygonum spp. (knotgrass redshank, black bindweed etc.), annual meadow-grass, charlock.
[5] Broadleaved weeds: all forbs in crop other than cleavers.
[6] Grass weeds except annual meadow grass, cleavers, creeping and spear thistle, broad-leaved and curled dock, ragwort.

Table 149. Key attributes for farmland wildlife. Criteria assessed by interview in italics.

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
Water voles, dragonflies, newts & toads				
EB6/OB6 Ditch management EB7/OB7 Half ditch management	Contains water in summer	Min 30cm depth	Plant species	10 or more submerged, floating or emergent native aquatic spp. per 20m
	Water level	No more than 45cm below mean field level	Plant species	5 or more submerged, floating or emergent native aquatic spp. per 20m
	Adjacent habitat	Grassland or at least 2m wide strip of permanent vegetation from top of bank	Algae	<30% cover of water
	Adjacent habitat	6m or more arable or grassland buffer strip option next to ditch	Non-natives[1]	absent
	Tall vegetation or scrub	100% of one side or 50% of both sides	Shade	<20% in heavy shade
			profile	>25% has gently sloping profile or berms and shelves
			Cutting bank vegetation	*Comply with guidance*
			Cleaning ditch	*Comply with guidance*
EE7/OE7 Buffering in-field ponds in grassland EE8/OE8 Buffering in-field ponds in arable land	Drain discharge	No drain discharge directly into pond	Width	Min 10m from pond to cropped area or intensively managed grassland
	Other ponds or wetland areas	Buffer connects two ponds or wetland areas	Scrub	<50% of pond margin
	Pond water	Water clear, <30% algal cover	Livestock access	<50% of pond margin
	Pond vegetation	submerged, floating or emergent native aquatic spp. present	Vehicular access	No signs of access (e.g. tracks)
	Presence of fish	*No fish*	*Establishment*	*By natural regeneration (not sowing)*
			Cutting	*No more than once every 5 years*

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
EJ9/OJ9 12m buffers for watercourses on cult. Land (CFE C1)	Adjacent watercourse	Contains water in summer	Width	Min 12m (can be up to 24m)
	Adjacent watercourse	Water clear, <30% algal cover	Livestock access	Livestock excluded
	Adjacent watercourse vegetation	submerged, floating or emergent native aquatic spp. present	Vehicular access	No signs of access (e.g. tracks)
	Tall vegetation or scrub	Present along bank of at least one side of watercourse (but <20% in heavy shade)	*Establishment*	*By natural regeneration (not sowing)*
			Cutting – 6m next to crop	*Cut annually after mid-July*
			Cutting – 6m next to field edge	*No more than once every 2 years*
EJ11/OJ11 Maintenance of watercourse fencing	Adjacent watercourse	Contains water in summer	Fencing	Stockproof and in good condition
	Adjacent watercourse	Water clear, <30% algal cover		
	Adjacent watercourse vegetation	submerged, floating or emergent native aquatic spp. present		
	Tall vegetation or scrub	Present along bank of at least one side of watercourse (but <20% in heavy shade)		
	Adjacent habitat	6m or more arable or grassland buffer strip option next to ditch		

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
Arable plants				
EF9 Unfertilised cereal headlands	Location in field	Edge of cereal field (not maize)	Width	Min 6m
	Adjacent habitat	buffer strip, stubble, wild bird seed mix, nectar mix	Broadleaved weed cover (not cleavers)	>10% cover (<2% =zero score)
	Soil type[4]	Sandy, shallow,chalky, stony	Undesirable weeds[2]	<10% cover (summer)
			Rare or very rare species present	Any species on list[3]
			Insecticide use	*None after 15 March*
			Herbicide	*Only permitted herbicides*
			Herbicide	*No broadleaved herbicide*
EF10 Unharvested cereal headlands (CFE C11)	Location in field	Edge of cereal field (not maize)	Width	Min 3m
	Adjacent habitat	buffer strip, stubble, wild bird seed mix, nectar mix	Broadleaved weed cover (not cleavers)	>10% cover (<2% =zero score)
	Soil type[4]	Sandy, shallow, chalky, stony	Undesirable weeds[2]	<10% cover (summer)
			Rare or very rare species present	Any species on list[3]
			Insecticide use	*None after 15 March*
			Herbicide	*Only permitted herbicides*
			Herbicide	*No broadleaved herbicide*
			Seed rate[4]	*Reduced seed rate used*
EF11/OF11 Uncropped cultivated margins for rare plants (CFE C8)	Location in field	At field edge	Width	Min 3m
	Soil type[4]	Sandy, shallow chalky, stony	Undesirable weeds[5]	<20% cover
	Erosion risk	Avoid fields at risk	Desirable plant spp[6]	20% or more cover
	Shading	Short (<2m high) boundary or on south, east or west side of boundary	Rare species present	Spp with scores 1-3[3]
			Very rare spp. present	Spp with score 4-9[3]
			Timing of cultivation	*varied*

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
EF13/OF13 Uncropped areas for ground-nesting birds (CFE C5)	Soil type[4]	Sandy, shallow, chalky, stony	Broadleaved weed cover (not cleavers)	>10% cover (<2% =zero score)
	Erosion risk	Avoid fields at risk	Undesirable weeds[2]	<10% cover (summer)
			Rare or very rare species present	Any species on list[3]
EF15 Reduced herbicide cereal crops followed by overwintered stubbles	Crop	Cereal (not maize)	Broadleaved weed cover (not cleavers)	>10% cover (<2% =zero score)
	Soil type[4]	Sandy shallow, chalky, stony	Undesirable weeds[2]	<10% cover (summer)
	Erosion risk	Avoid fields at risk	Rare or very rare species present	Any species on list[3]
			Insecticide use	*None after 15 March*
			Herbicide	*Only permitted herbicides*
			Herbicide	*No broadleaved herbicide*
			Pre-harvest desiccant or post-harvest herbicide	*Not applied*

[1] Including Australian swamp stonecrop, New Zealand pygmyweed, floating pennywort, waterfern, parrot's feather (in water); Japanese knotweed (on bank).
[2] Cleavers, grass weeds except annual meadow grass.
[3] See 'Important Arable Plant Areas' report, Appendix II.
[4] Attributes relevant to ELS only or with different criteria to CFE are shown with pale blue background
[5] Grass weeds except annual meadow grass, cleavers, creeping and spear thistle, broad-leaved and curled dock, ragwort.
[6] Broadleaved plants other than cleavers, creeping and spear thistle, broad-leaved and curled dock, ragwort.
[7] Attributes not related to theme are shown with grey background These will not be included in the scores for this theme.

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
Bats and dormice				
EB3/OB3 Enhanced hedgerow management	Trees	Located at edge of woodland/scrub or mature hedgerow trees present	Height	Min 2m (from top of bank) (unless recently laid or coppiced)
	Species-richness	5 or more native woody spp per 30m length (4 in north of England)	Width	Min 1.5m
	Age	Clearly old, as indicated by width of stems (or stumps if coppiced)	Gaps	No gaps
	Control of both sides	Located where agreement holder has control of both sides, except where next to woodland	Herbaceous vegetation	Min 1m width of perennial herbaceous vegetation from trim line of hedge
			Cutting of hedge	*No more than once every 3 years (can be less often)*
EC3/OC3 Maintenance of woodland fences	Woodland type	Native trees of mixed age, not planted in rows, ground flora contains plants typical of old woodland (e.g. bluebell, wild garlic etc)	Fencing	Stockproof and in good condition
	Woodland edge	Hedgerow &/or shrubby trees between large trees and field	Herbaceous vegetation	Min 2m width of perennial herbaceous vegetation between woodland edge and cultivated land or managed grassland
EC4/OC4 Management of woodland edges	Woodland type	Native trees of mixed age, not planted in rows, ground flora contains plants typical of old woodland (e.g. bluebell, wild garlic etc)	Width of woodland edge area	Min 6m
			Scrub cover	Max 50%
			Cutting	Max 1/3 shrubby growth per year, not between 1 March and 31 August
			Supplementary feeding	No water troughs, mineral licks or feeding stations within woodland edge area
			Poaching	No poaching by livestock within woodland edge area
			Buffer strip	Presence of buffer strip option next to woodland edge area

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
EC23/OC23 Establishment of hedgerow trees by tagging	Hedge species-richness	5 or more native woody spp per 30m length (4 in north of England)	Tagged trees	Native species (not elm)
	Age	Clearly old, as indicated by width of stems (or stumps if coppiced)	Condition of tagged trees	Straight stem, no damage
	Management	Hedgerow in option EB3, OB3, EB10 or OB10		
EC24/OC24 Hedgerow tree buffer strips on cultivated land	Tree species	Hedgerow trees are native species	Width	Min 6m
	Tree age	At least one of the hedgerow trees is 'ancient'	Vegetation	Min 10% cover of broadleaved herbs (not including undesirable species[1])
			Fallen timber	Left *in situ*
			Cutting of trees	No removal of branches within life of agreement, except next to public road or right of way
			Establishment	*Natural regeneration or sown with mix including wild flowers*
			Cutting – 3m next to crop (after first 1-2 years)	*Cut annually after mid-July*
			Cutting – 3m next to field edge (after first 1-2 years)	*No more than once every 2 years[2] (or 10 years if next to wood).*
EC25/OC25 Hedgerow tree buffer strips on grassland	Tree species	Hedgerow trees are native species	Width	Min 6m
	Tree age	At least one of the hedgerow trees is 'ancient'	Hay or silage fields	Strip left uncut
			Grazed fields	No poaching or overgrazing of buffer strip
			Vehicular access	No signs of access (e.g. tracks)
			Livestock damage	No damage to trees by livestock
			Cutting of trees	No removal of branches within life of agreement, except next to public road or right of way

[1] Creeping and spear thistle, broad-leaved and curled dock, ragwort, non-natives including Japanese knotweed and Himalayan balsam.
[2] Unless sown with wildflower mix when more frequent cutting may be carried out – see ELS handbook.

Option	Location		Condition	
	Attribute	Criteria	Attribute	Criteria
Butterflies, bees and vulnerable grassland				
EB3/OB3 Enhanced hedgerow management	Species-richness	5 or more native woody spp per 30m length (4 in north of England)	Height	Min 2m (from top of bank) (unless recently laid or coppiced)
	Aspect	Not north, north-east or north-west facing	Width	Min 1.5m
	Control of both sides	Located where agreement holder has control of both sides, except where next to woodland	Gaps	No more than 10% of length as gaps, no gap >5m wide
			Herbaceous vegetation	Min 1m width of perennial herbaceous vegetation from trim line of hedge
			Floral resources - shrubs	Evidence of flowers or fruits along at least 50% of 30m hedge length
			Floral resources - herbs	Min 10% cover of insect-pollinated broadleaved herbs in margin strip[1]
			Cutting of hedge	*No more than once every 3 years (can be less often)*
EC4/OC4 Management of woodland edges	Woodland type	Native trees of mixed age, not planted in rows, ground flora contains plants typical of old woodland (e.g. bluebell, wild garlic etc)	Width of woodland edge area	Min 6m
	Aspect	Not north, north-east or north-west facing	Scrub cover	Max 50%
			Cutting	Max 1/3 shrubby growth per year, not between 1 March and 31 August
			Floral resources - shrubs	Evidence of flowers or fruits on at least 50% shrubs along 30m length
			Floral resources - herbs	Min 10% cover of insect-pollinated broadleaved herbs in herbaceous areas[1]
			Supplementary feeding / poaching	No supplementary feeding or poaching by livestock within woodland edge area
			Buffer strip	Presence of buffer strip option next to woodland edge area

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
EF1/OF1 Management of field corners	Location	Next to hedge or wood which is not north, north-east or north-west facing	Floral resources - herbs	Min 10% cover of insect-pollinated broadleaved herbs[1]
			Establishment	*Natural regeneration or sown with mix including wild flowers*
			Cutting (after first year)	*No more than once every 5 years. Not between 1 March and 31 August*
			Vehicular access	No signs of access (e.g. tracks)
EF4/OF4 Nectar flower mixture (CFE C12a)	Location in field	At field edge	Width	Min 6m
	Adjacent habitat	Next to hedge or wood which is not north, north-east or north-west facing	No. crop types	At least four from list in handbook[2]
			%cover sown crops	75 % or more in summer
			Flower abundance	30 or more per m^2
			Undesirable weeds[3]	<10% cover (summer)
			Summer cut	*Part of area (not all) cut between mid-June and 1st week July*
			Autumn cut	*Autumn cut between 15 Sept & 31 Oct*
			Removal of cuttings	*Cuttings removed or shredded*
EK3/OK3 Permanent grassland with very low inputs	Grassland type	semi-improved or unimproved	Grazing management[4]	At least 20% <7cm in height
	Grassland type	unimproved	Grazing management	At least 20% >7cm in height
			Floral resources	Min 20% cover of insect-pollinated broadleaved herbs[1]
			Floral resources	Min 10% cover of insect-pollinated broadleaved herbs[1]
			Cutting management[4]	*Cut once (but not twice or more)*

[1] List to be provided.

[2] Red clover, alsike clover, birds-foot-trefoil, sainfoin, musk mallow, common knapweed.

[3] Creeping and spear thistle, broad-leaved and curled dock, ragwort.

[4] Assess either under grazing or cutting management, not both.

Table 150. Key attributes for cleaner water and healthier soil options (plus CFE equivalents where applicable[1]). Criteria assessed by interview in italics.

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
Tackle the source				
EG1/OG1 Undersown spring cereals	Crop	Spring cereal (not maize)	Establishment of grass	Even presence of grass throughout crop (present in at least 90% of 10cm x 10cm quadrats in summer)
			Establishment of legume	Even presence of legume throughout crop (present in at least 70% of 10cm x 10cm quadrats in summer)
			Ground cover in autumn	At least 40% ground cover by October
			Soil conditions	No obvious compaction, flooding or runoff in autumn/winter.
EJ2/OJ2 Management of maize crops to reduce soil erosion (NB none in sample)	Location	Not on fields at risk of soil erosion or runoff as identified in FER (see page 37 of ELS handbook)	Post harvest cultivation	Maize harvested by 1 October and soil cultivated within 2 weeks OR compaction removed within 2 weeks of harvest if undersown.
			Erosion / runoff	No visible signs after harvest.
			Slurry and manure	*Applications comply with rules in guidebook*
EJ10 Enhanced management of maize crops to reduce soil erosion and runoff	Location	Not on fields at risk of soil erosion or runoff as identified in FER (see page 37 of ELS handbook)	Post harvest cultivation	Maize harvested by 1 October and compaction removed within 2 weeks
			Cover crop	Cover crop sown/established successfully (present in 90% of 10cm x 10cm quadrats in late autumn/winter)
			Erosion / runoff	No visible signs after harvest.
			Slurry and manure	*Applications comply with rules in guidebook*
EJ13/OJ13 Winter cover crops (NB none in sample) (CFE C7b)	Soil type	Sandy, not clay	Crop type	Rye, vetch, Phacelia, barley, mustard or a mixture of these
			Establishment	Cover crop sown/established successfully (present in 90% of 10cm x 10cm quadrats in late autumn/winter)
			Erosion / runoff	No visible signs after harvest.
			Sowing	*Before 15 September*

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
Slow the pathway				
EF1/OF1 Management of field corners	Location	Placed where it can reduce erosion or stop sediment entering watercourse (e.g. in valley bottom, at bottom of slope, by watercourse)	Cover of bare ground/dead vegetation	Max 10% in summer
	Soil type	High risk (sandy, light silty, peaty or clay)	Undesirable spp.[2]	<10% cover (winter)
			Vehicular access	No tracks, ruts, or compacted areas
			Cutting (after first year)	*No more than once every 5 years.*
EK1/OK1 Take field corners out of management	Location	Placed where it can reduce erosion or stop sediment entering watercourse (e.g. in valley bottom, at bottom of slope, by watercourse)	Cover of bare ground/dead vegetation	Max 10% in summer
	Soil type	High risk (sandy, light silty, peaty or clay)	Undesirable spp.[2]	<10% cover (winter)
			Vehicular access etc.	No tracks, ruts, compacted areas or poaching
			Grazing	none
			Cutting (after first year)	*No more than once every 5 years.*
EF7/OF7 Beetle banks	Location	Across slope	Height	Min 30cm
	Soil type	High risk (sandy, light silty, peaty or clay)	Width	Between 2m and 4m
			Cover of bare ground/dead vegetation	Max 10% in summer
			Undesirable spp.[2]	<10% cover (winter)
			Cutting (after first year)	*No more than once every 5 years.*

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
EJ5/OJ5 In-field grass areas to prevent soil erosion and runoff (CFE C2) None in sample	Location	Across slope or intercepting drainage path e.g. valley bottom or at bottom of slope	Width	Min 10m
	Soil type	High risk (sandy, light silty, peaty or clay)	Cover of bare ground/dead vegetation	Max 10% in summer
			Cover of bare ground/dead vegetation	Max 20% in summer
			Vehicular access	No tracks, ruts, compacted areas, poaching
			Undesirable spp.[2]	<10% cover (winter)
			Grazing	none
			Cutting	Every year (after mid-July)
EK2/OK2 Permanent pasture with low inputs EK3/OK3 Permanent pasture with very low inputs	Location	On slope	Cover of bare ground/dead vegetation	Max 10% in summer
	Soil type	High risk (sandy, light silty, peaty or clay)	Cover of bare ground/dead vegetation	Max 20% in summer
			Vehicular access	No tracks, ruts, compacted areas, poaching
			Undesirable spp.[5]	<10% cover (winter)
EK4/OK4 Management of rush pastures	Location	On slope	Cover of bare ground/dead vegetation	Max 10% in summer
	Soil type	High risk (sandy, light silty, peaty or clay)	Cover of bare ground/dead vegetation	Max 20% in summer
			Undesirable spp.[5]	<10% cover (winter)

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
Protect the receptor				
EE9/OE9 6m buffer strip on cultivated land next to a watercourse (CFE C1)	Location in field	Alongside watercourse	Width	Min 6m (excluding cross-compliance strip)
	Topography	At bottom of slope	Cover of bare ground/dead vegetation	Max 10% in summer
	Soil type	High risk (sandy, light silty, medium, chalk & limestone soils)	Cover of bare ground/dead vegetation	Max 20% in summer
	Slope	2-7ºon medium, chalk & limestone soils; 2-11º on sandy and light silty soils	Undesirable spp.[2]	<10% cover (winter)
			Use for access	No tracks, ruts, compacted areas, poaching
			Establishment	*By sowing*
			Cutting – 3m next to crop	*Annually, after 31 July*
			Cutting – 3m next to watercourse	*None or at most every 2 years*
			Removal of cuttings	*Cuttings removed or not cut*
EE10/OE10 6m buffer strip on intensive grassland next to a watercourse (CFE C1[3])	Location in field	Alongside watercourse	Width	Min 6m
	Topography	At bottom of slope	Cover of bare ground/dead vegetation	Max 10% in summer
	Soil type	Sandy, light silty, medium, chalk & limestone soil	Cover of bare ground/dead vegetation	Max 20% in summer
	Slope	2-7ºon medium, chalk & limestone soils; 2-11º on sandy and light silty soils	Undesirable spp.[2]	<10% cover (winter)
			Hay or silage fields	Strip left uncut
			Grazed fields	No poaching of buffer strip
			Use for access	No tracks, ruts, compacted areas

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
EJ9/OJ9 12m buffer strips for watercourses on cultivated land (CFE C1)	Location in field	Alongside watercourse	Width	Min 12m (can be up to 24m)
	Topography	At bottom of slope	Cover of bare ground/dead vegetation	Max 10% in summer
	Soil type	Sandy, light silty, medium, chalk & limestone soil	Cover of bare ground/dead vegetation	Max 20% in summer
	Slope	2-7º on medium, chalk & limestone soils; 2-11º on sandy and light silty soils	Undesirable spp.[2]	<10% cover (winter)
			Use for access	No tracks, ruts, compacted areas
			Livestock access	Livestock excluded
			Establishment	*By sowing*
			Cutting – 6m next to crop	*Cut annually after mid-July*
			Cutting – 6m next to field edge	*No more than once every 2 years*[4]
			Removal of cuttings	*Cuttings removed*
EJ11/OJ11 Maintenance of watercourse fencing	Adjacent habitat	6m or more arable or grassland buffer strip option next to ditch	Fencing	Stockproof and in good condition

[1] Attributes relevant to ELS only or with different criteria to CFE are shown with pale blue background

[2] Creeping and spear thistle, broad-leaved and curled dock, ragwort, non-natives including Japanese knotweed and Himalayan balsam.

[3] Although C1 is identified as the CFE equivalent, the prescriptions are different and so the assessment criteria are not comparable.

[4] Unless sown with wildflower mix when more frequent cutting may be carried out – see ELS handbook.

[5] Creeping thistle, spear thistle, broad-leaved dock, curled dock, common ragwort, marsh ragwort, nettle, cow parsley, bracken.

Table 151. Key attributes for historic environment options[1]. Criteria assessed by interview in italics.

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
Traditional farm buildings				
ED1/OD1 Maintenance of weatherproof traditional farm buildings	Eligible building	Pre-1940, traditional materials, used for agriculture (not farmhouse)	Condition	Sound and weatherproof
			Materials	Any repairs use traditional materials[1]
Archaeology under cultivation				
ED2/OD2 Take out of cultivation archaeological features that are currently on cultivated land	Location	Situated on archaeological feature, covering whole of feature	Sward cover	No bare patches (>4m^2) over feature
			Supplementary feeding	No supplementary feed points, water troughs or mineral licks on or next to feature
			Scrub	No scrub on feature
			Vehicle access	No rutting or compaction
			Storage of materials	No materials storage
ED3/OD3 Reduced depth, non-inversion cultivation on archaeological features (minimum till)	Location	Situated on archaeological feature, covering whole of feature	Crops	Not short rotation coppice, Miscanthus, maize, beet, potatoes or other roots except for grazing *in situ* (e.g. fodder beet, stubble turnips)
			Machinery use & access	No rutting or compaction
			Cultivations	Minimum tillage or broadcast/direct drill. No ploughing allowed.
			Ground cover	*Retain stubble till 14 February if crop not sown in autumn*

Option	Location		Condition	
	Attribute	**Criteria**	**Attribute**	**Criteria**
Archaeology under grass				
ED4/OD4 Management of scrub on archaeological features (NB none in sample)				
ED5/OD5 Management of archaeological features on grassland	Location	Situated on archaeological feature, covering whole of feature	Sward cover	No bare patches (>4m^2) over feature
	Location		Supplementary feeding	No supplementary feed points, water troughs or mineral licks on or next to feature
			Scrub	No scrub on feature
			Vehicle access	No rutting or compaction
			Storage of materials	No materials storage

[1] If possible assess with reference to photos that the agreement holder should have taken at the beginning of the agreement. Where non-traditional materials were used previously (e.g. corrugated iron to cover roofs), these can be retained and maintained appropriately.

APPENDIX 2 SUMMARY OF ATTRIBUTES MEASURED IN THE FIELD WHICH WERE NOT SUBJECT TO STATISTICAL ANALYSIS

Data are presented for features under agreement against individual options and for comparable control features not in an ES agreement. A range of features not in agreement were assessed on agreement farms and features were also assessed on non-participant (NP) farms (see section 2.2.3). Where a feature was recorded on at least ten farms, these data are presented. Comparisons between features in agreement and similar features on non-participant farms are presented separately from data for comparisons of features in and out of agreement on the same farm. Where insufficient on-farm controls or non-participant comparisons are available, attributes have been summarised only for those features in agreement. For numeric attributes, means and SEMs are presented based on farm means. For text (yes/no) attributes, the proportion of features with a positive response are presented.

Table 152. EB1,2,3 and non-participant hedges (CCS = cross compliance strip).

Attribute	Option	n farms	Mean	SEM
Laying/coppicing	EB1	58	0.02	0.018
	EB2	68	0.02	0.007
	EB3	49	0.03	0.016
	NP	22	0	0
% cover non-native woody sp.	EB1	56	0.4	0.15
	EB2	65	2.1	1.24
	EB3	46	0.5	0.25
	NP	22	0.2	0.17
No. non-native boundary trees	EB1	56	0.23	0.169
	EB2	64	0.20	0.121
	EB3	45	0.38	0.228
	NP	22	0.01	0.015
Girth extra large	EB1	57	0.23	0.062
	EB2	65	0.15	0.053
	EB3	46	0.20	0.113
	NP	22	0.11	0.055
Girth large	EB1	57	1.99	0.441
	EB2	65	2.91	0.450
	EB3	46	2.17	0.437
	NP	22	1.94	0.505
Girth medium	EB1	57	0.84	0.417
	EB2	65	0.86	0.314
	EB3	46	0.90	0.281
	NP	22	0.80	0.565
Girth small	EB1	57	0.19	0.130
	EB2	65	0.14	0.069
	EB3	46	0.05	0.028
	NP	22	0	0
% cover CCS invasive sp.	EB1	57	0.02	0.017
	EB2	68	0.03	0.021
	EB3	49	0.16	0.118
	NP	22	0	0
% cover non-native herbs	EB1	57	0	0
	EB2	68	0.02	0.020
	EB3	49	0	0
	NP	22	0.02	0.015

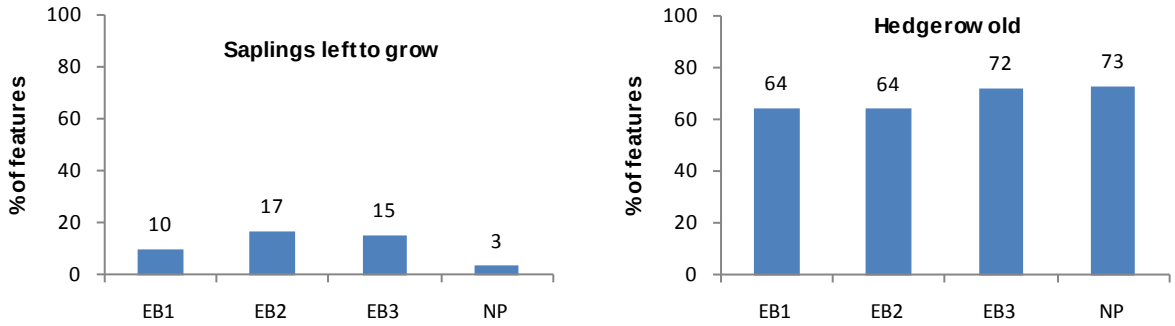

Figure 68. Proportion of features with positive answers for EB1,2,3 and non-participants.

Table 153. EB1,2,3 and on-farm control features.

Attribute		Option			Control		
	Option code	n farms	Mean	SEM	n farms	Mean	SEM
% cover non-native woody sp.	EB1	19	0.5	0.37	19	0.4	0.35
	EB2	24	0.8	0.35	22	0.4	0.31
	EB3	17	0.7	0.59	18	0	0
No. non-native boundary trees	EB1	18	0.13	0.098	18	0	0
	EB2	21	0.10	0.057	23	0.32	0.153
	EB3	17	0.16	0.122	17	0.41	0.351
Girth extra large	EB1	18	0.18	0.090	18	0.22	0.101
	EB2	22	0.07	0.051	23	0.10	0.049
	EB3	17	0.33	0.293	17	0.20	0.086
Girth large	EB1	18	2.11	0.597	18	1.35	0.338
	EB2	22	2.99	0.843	23	2.11	0.540
	EB3	17	1.61	0.608	17	3.03	0.940
Girth medium	EB1	18	0.28	0.179	18	0.44	0.185
	EB2	22	0.56	0.209	23	0.73	0.236
	EB3	17	0.69	0.306	17	1.18	0.333
Girth small	EB1	18	0.13	0.130	18	0	0
	EB2	22	0.12	0.094	23	0.06	0.040
	EB3	17	0.04	0.039	17	0.08	0.054
% cover invasive sp.	EB1	20	0	0	20	0.13	0.125
	EB2	24	0.01	0.014	24	0.15	0.139
	EB3	18	0.09	0.093	18	0.11	0.093
% cover non-native herbs	EB1	20	0	0	20	0	0
	EB2	24	0	0	24	0	0
	EB3	18	0	0	18	0	0

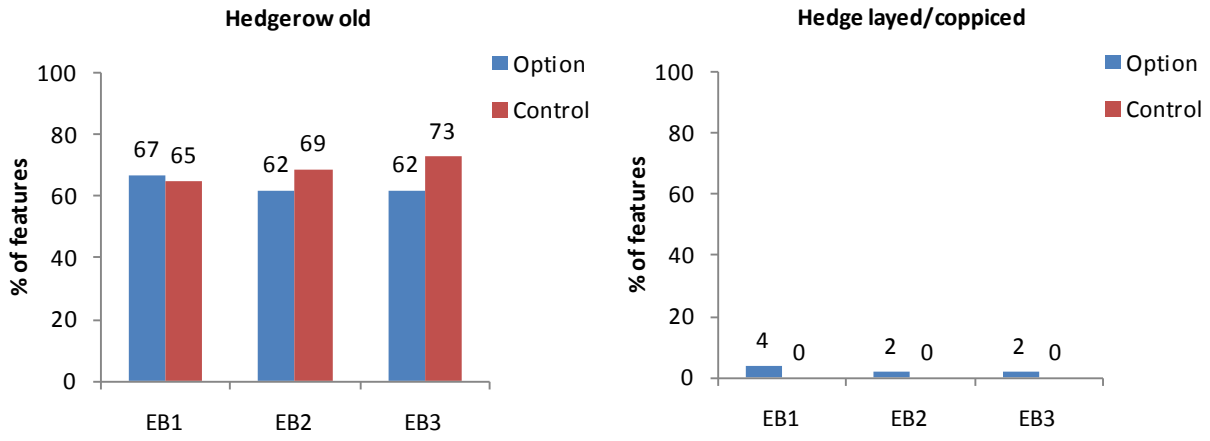

Figure 69. Proportion of features with positive answers for EB1,2,3 and on-farm controls.

Table 154. EB6,7 and non-participant ditches.

Attribute		n farms	Mean	SEM
Water depth (cm)	EB6	38	11.9	2.56
	EB7	15	16.8	7.71
	NP	17	20.5	5.95
Water level	EB6	32	62.0	10.32
	EB7	14	59.6	21.98
	NP	14	87.4	19.92
% cover heavy shade	EB6	39	35.0	4.71
	EB7	15	38.2	9.42
	NP	17	26.5	7.62
% water covered with algae	EB6	37	1.5	1.11
	EB7	15	1.3	0.87
	NP	16	0.8	0.63
% cover bank bare ground	EB6	39	6.0	1.89
	EB7	15	5.1	2.83
	NP	17	3.7	1.28
% cover bank coarse grasses	EB6	39	34.2	3.46
	EB7	15	35.8	4.15
	NP	17	34.3	5.38
% cover bank dead vegetation	EB6	39	1.6	0.57
	EB7	15	1.6	0.59
	NP	17	4.2	2.30
% cover bank fine grasses	EB6	39	13.0	2.58
	EB7	15	9.1	2.58
	NP	17	10.7	4.51

Attribute		n farms	Mean	SEM
% cover bank forbs	EB6	39	34.0	3.02
	EB7	15	32.2	5.82
	NP	17	32.9	5.04
% cover bank woody species	EB6	39	11.2	2.30
	EB7	15	16.2	5.81
	NP	17	14.2	4.84
% cover bank annuals	EB6	35	7.4	2.71
	EB7	13	11.5	3.80
	NP	17	2.1	0.50
% cover bank perennials	EB6	35	92.6	2.71
	EB7	13	88.7	3.79
	NP	17	97.9	0.50
% cover bank bramble	EB6	39	5.1	1.06
	EB7	15	2.1	0.39
	NP	17	3.9	0.97
% cover bank injurious sp.	EB6	39	4.3	0.68
	EB7	15	6.1	1.58
	NP	17	5.4	1.88
% cover bank invasive sp.	EB6	39	0	0
	EB7	15	1.5	1.22
	NP	17	0.1	0.14
% cover bank nitrophilous sp.	EB6	39	11.5	2.62
	EB7	15	5.4	1.33
	NP	17	13.5	2.8
% cover bank non-native herbs	EB6	39	0	0
	EB7	15	0.2	0.22
	NP	17	0	0
% cover CCS bare ground	EB6	38	5.4	1.87
	EB7	15	2.9	1.61
	NP	17	2.2	0.78
% cover CCS coarse grasses	EB6	38	41.0	3.81
	EB7	15	41.9	4.63
	NP	17	38.6	4.99
% cover CCS dead vegetation	EB6	38	1.5	0.60
	EB7	15	1.1	0.39
	NP	17	4.4	2.30
% cover CCS fine grasses	EB6	38	15.8	2.43
	EB7	15	14.3	2.86
	NP	17	19.8	5.95
% cover CCS forbs	EB6	38	30.0	2.54
	EB7	15	28.1	3.69
	NP	17	28.5	3.99

Attribute		n farms	Mean	SEM
% cover CCS woody sp.	EB6	38	6.3	1.25
	EB7	15	11.6	5.60
	NP	17	6.5	1.66
% cover CCS annuals	EB6	34	8.7	2.93
	EB7	13	10.1	3.65
	NP	17	1.9	0.45
% cover CCS perennials	EB6	34	91.3	2.93
	EB7	13	89.9	3.65
	NP	17	98.1	0.45
% cover CCS bramble	EB6	38	3.6	0.71
	EB7	15	1.8	0.42
	NP	17	2.8	0.93
% cover CCS injurious sp.	EB6	38	4.7	0.64
	EB7	15	6.8	1.55
	NP	17	5.2	1.90
% cover CCS invasive sp.	EB6	38	0	0
	EB7	15	1.3	1.22
	NP	17	0.1	0.14
% cover CCS nitrophilous sp.	EB6	38	10.7	2.00
	EB7	15	5.1	1.36
	NP	17	13.5	2.93
% cover CCS non-native herbs	EB6	38	0	0
	EB7	15	0	0
	NP	17	0	0

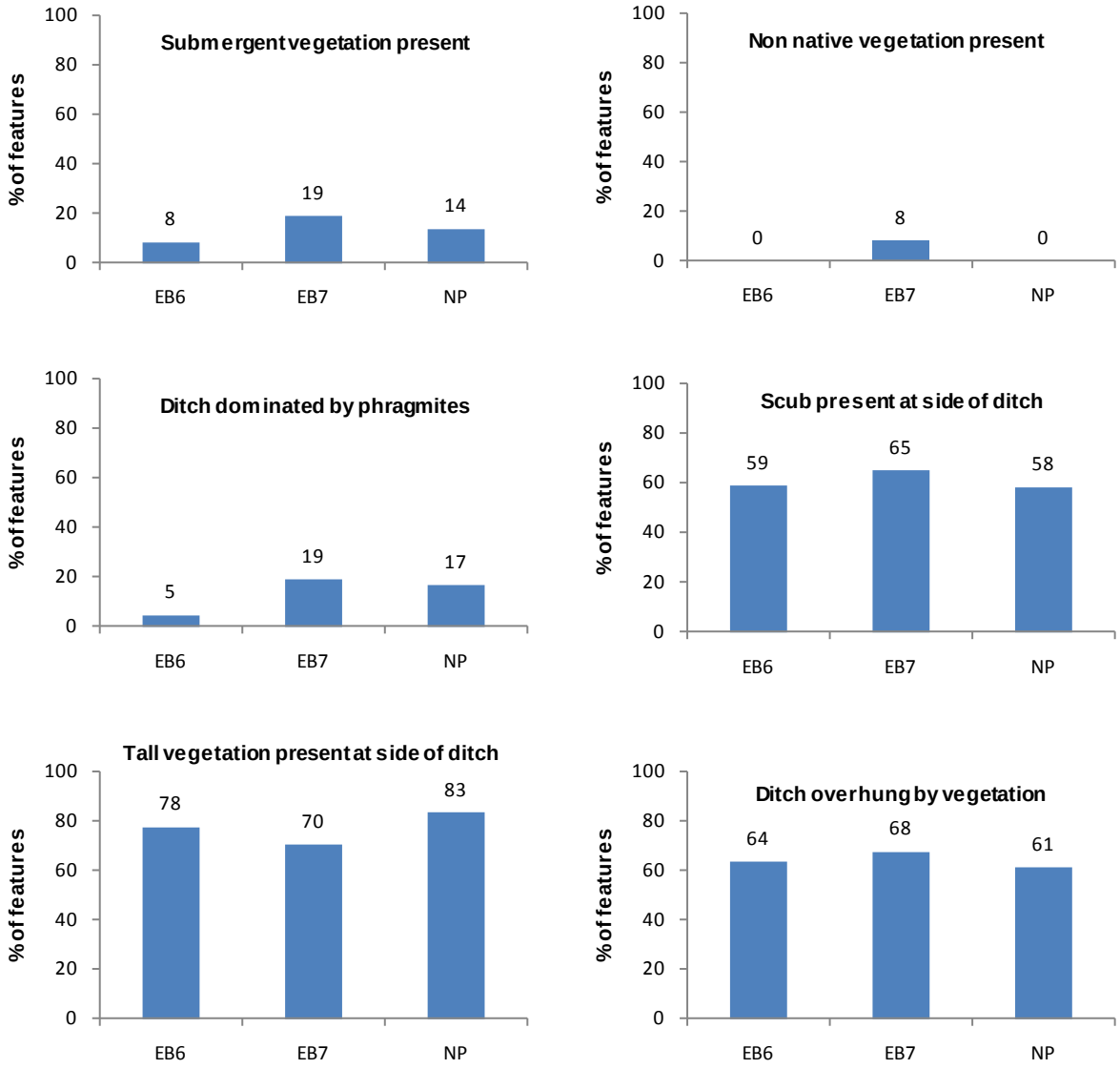

Figure 70. Proportion of features with positive answers for EB6,7 and non-participant farms.

Table 155. EB8,9,10 and non-participant hedge/ditches.

Attribute	Option	n farms	Mean	SEM
% cover non-native woody sp.	EB8	26	0.44	0.22
	EB9	17	0.82	0.55
	EB10	5	0	0
	NP	16	0.13	0.11
No. non-native boundary trees	EB8	26	0.26	0.14
	EB9	17	0.04	0.04
	EB10	7	0.14	0.14
	NP	17	0.18	0.18
Girth extra large	EB8	26	0.17	0.068
	EB9	17	0.08	0.061
	EB10	7	0	0
	NP	17	0.12	0.081
Girth large	EB8	26	3.2	0.63
	EB9	17	1.9	0.57
	EB10	7	2.2	0.90
	NP	17	3.4	1.03
Girth medium	EB8	26	0.9	0.27
	EB9	17	0.9	0.48
	EB10	7	0.1	0.14
	NP	17	0.5	0.25
Girth small	EB8	26	0.05	0.051
	EB9	17	0.10	0.098
	EB10	7	0	0
	NP	17	0	0
% cover bank bare ground	EB8	25	5.0	1.96
	EB9	19	10.1	5.20
	EB10	7	6.4	4.85
	NP	17	6.9	2.29
% cover bank coarse grasses	EB8	25	36.1	4.20
	EB9	19	34.0	4.32
	EB10	7	32.3	5.68
	NP	17	9.9	3.20
% cover bank dead vegetation	EB8	25	2.9	1.59
	EB9	19	0.7	0.42
	EB10	7	0	0
	NP	17	1.9	0.70
% cover bank fine grasses	EB8	25	9.3	2.06
	EB9	19	10.7	2.46
	EB10	7	18.3	5.18
	NP	17	11.4	3.02
% cover bank forbs	EB8	25	38.9	3.75
	EB9	19	34.2	5.44
	EB10	7	37.3	6.01
	NP	17	37.7	3.88

Attribute	Option	n farms	Mean	SEM
% cover bank woody sp.	EB8	25	7.9	2.38
	EB9	19	10.2	4.02
	EB10	7	5.7	2.58
	NP	17	9.11	3.07
% cover bank bramble	EB8	25	5.9	1.14
	EB9	19	6.1	1.82
	EB10	7	9.6	5.97
	NP	17	9.9	3.20
% cover bank annual	EB8	22	3.5	0.90
	EB9	17	4.2	2.59
	EB10	6	1.6	1.06
	NP	16	3.9	1.09
% cover bank perennials	EB8	22	96.5	0.89
	EB9	17	95.8	2.59
	EB10	6	98.4	1.06
	NP	16	96.1	1.09
% cover bank injurious sp.	EB8	25	4.5	0.54
	EB9	19	5.8	1.53
	EB10	7	4.4	1.11
	NP	17	4.8	1.37
% cover bank invasive sp.	EB8	25	0.04	0.04
	EB9	19	0	0
	EB10	7	0	0
	NP	17	0.29	0.29
% cover bank nitrophilous sp.	EB8	25	15.9	2.54
	EB9	19	14.0	3.89
	EB10	7	6.0	2.53
	NP	17	14.7	2.41
% cover bank non-native herbs	EB8	25	0	0
	EB9	19	0	0
	EB10	7	0	0
	NP	17	0	0
% cover CCS bare ground	EB8	26	4.4	1.81
	EB9	19	2.7	1.19
	EB10	7	3.3	2.60
	NP	17	3.1	1.12
% cover CCS coarse grasses	EB8	26	37.8	3.83
	EB9	19	42.7	4.51
	EB10	7	37.3	3.60
	NP	17	40.5	3.23
% cover dead vegetation	EB8	26	3.6	1.77
	EB9	19	0.5	0.31
	EB10	7	0	0
	NP	17	40.5	3.23

Attribute	Option	n farms	Mean	SEM
% cover CCS fine grasses	EB8	26	12.2	2.14
	EB9	19	14.7	2.79
	EB10	7	22.4	3.49
	NP	17	14.5	2.65
% cover CCS forbs	EB8	26	35.2	3.59
	EB9	19	29.4	4.09
	EB10	7	33.2	4.23
	NP	17	32.4	2.98
% cover CCS woody sp.	EB8	26	6.9	2.14
	EB9	19	4.7	1.86
	EB10	7	3.8	1.04
	NP	17	8.0	3.11
% cover CCS annuals	EB8	23	3.3	0.87
	EB9	16	4.1	2.75
	EB10	6	2.0	1.12
	NP	16	3.7	1.06
% cover CCS perennials	EB8	23	96.7	0.87
	EB9	17	90.3	6.21
	EB10	6	98.0	1.16
	NP	16	96.3	1.06
% cover CCS bramble	EB8	26	7.1	2.06
	EB9	19	4.5	0.96
	EB10	7	5.8	2.48
	NP	17	7.7	2.81
% cover CCS injurious sp.	EB8	26	4.5	0.51
	EB9	19	6.2	1.55
	EB10	7	5.0	0.93
	NP	17	5.1	1.33
% cover CCS invasive sp.	EB8	26	0.04	0.039
	EB9	19	0	0
	EB10	7	0	0
	NP	17	0.29	0.294
% cover CCS nitrophilous sp.	EB8	26	13.9	2.4
	EB9	19	10.9	2.9
	EB10	7	7.5	3.0
	NP	17	10.8	1.8
% cover CCS non-native herbs	EB8	26	0	0
	EB9	19	0	0
	EB10	7	0	0
	NP	17	0	0

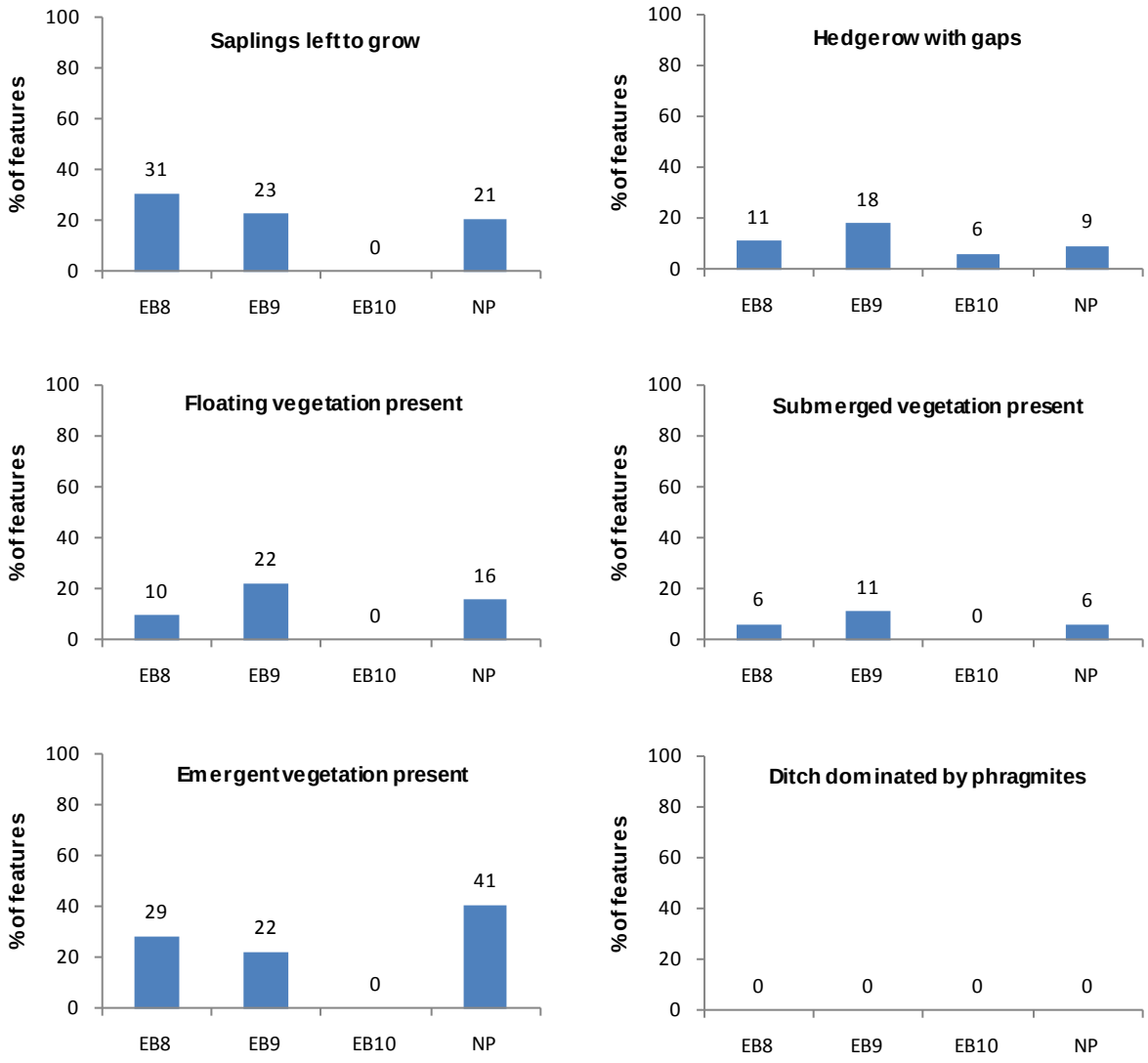

Figure 71. Proportion of features with positive answers for EB8,9,10 and non-participant farms.

Table 156. Summary of EB12/13 option attributes.

EB12/13 combined	n farms	Mean	SEM
% gaps	8	0.3	0.19

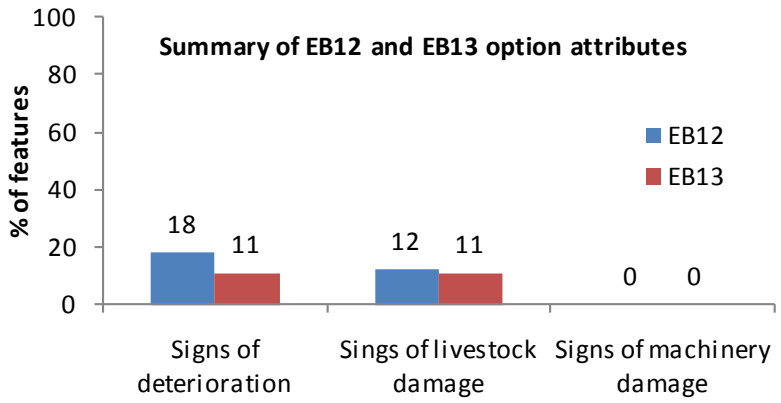

Figure 72. Proportion of features with positive answers for EB12 and EB13.

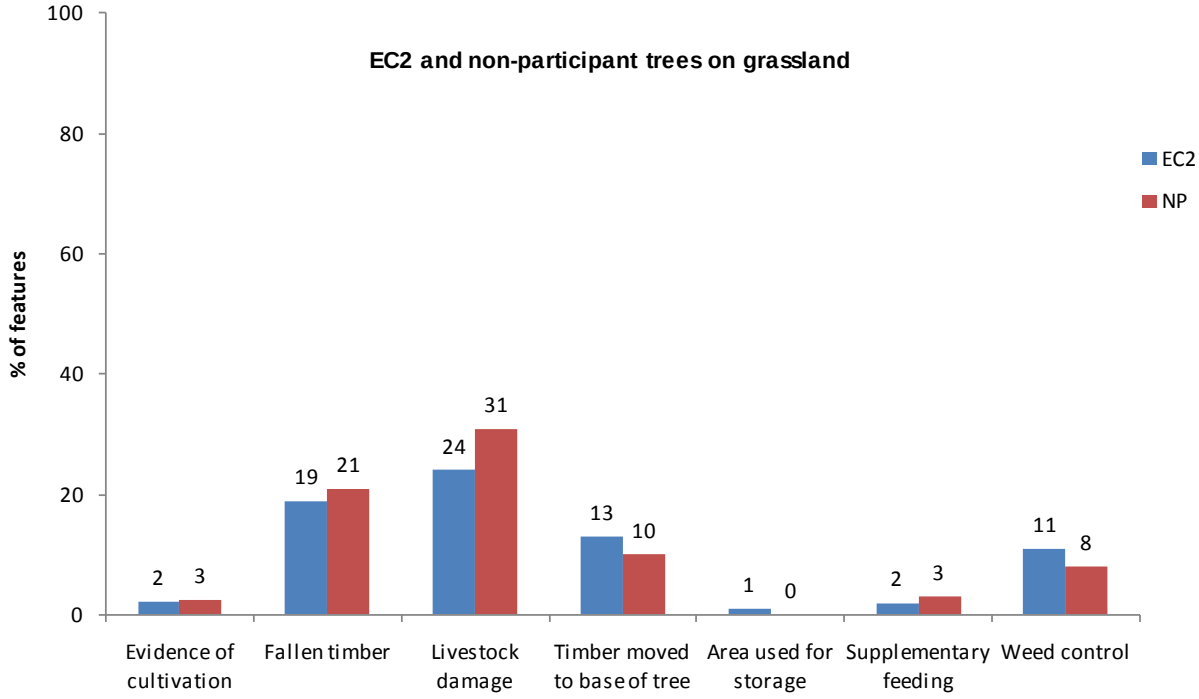

Figure 73. Proportion of features with positive answers for EC2 and non-participant farms.

Table 157. EC4 and non-participant woodland edges.

Attribute	Option code	Number	Mean	SEM
Width of buffer strip (m)	EC4	4	8.0	3.08
	NP	4	4.5	2.87
Width of uncultivated area	EC4	7	22.4	13.12
	NP	9	11.7	5.21
% cover broad-leaved dock	EC4	8	0.6	0.17
	NP	11	1.5	0.62
% cover creeping thistle	EC4	8	3.2	1.22
	NP	11	3.2	1.17
% cover curled dock	EC4	8	0.6	0.26
	NP	11	0.4	0.31
% cover himalayan balsam	EC4	8	0	0
	NP	11	0.2	0.18
% cover japanese knotweed	EC4	8	0	0
	NP	11	0	0
% cover native species	EC4	8	92.9	4.86
	NP	11	82.6	10.24
% cover ragwort	EC4	8	0.7	0.49
	NP	11	0.5	0.28
% cover rhododendron	EC4	8	0	0
	NP	11	0	0
% shrub cover on uncultivated strip	EC4	8	6.2	2.28
	NP	11	14.5	5.86
% cover spear thistle	EC4	8	0.2	0.14
	NP	11	0.8	0.63
% cover insect pollinated plants	EC4	8	18.8	6.44
	NP	4	27.5	16.39

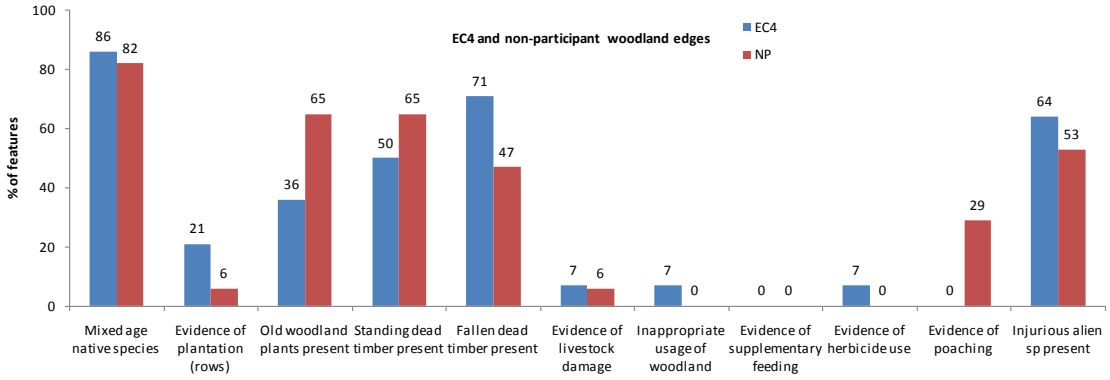

Figure 74. Proportion of features with positive answers for EC4 and non-participant woodland edges.

Table 158. EE1,2,3, and non-participant buffer strips on arable land.

Attribute	Option/NP	n farms	Mean	SEM
% cover bank Bare ground	EE1	8	1.75	0.587
	EE2	17	3.569	1.287
	EE3	20	2.867	0.88
	NP	11	2.564	0.62
% cover bank coarse grasses	EE1	8	50.79	6.127
	EE2	17	45.67	5.197
	EE3	20	44.13	4.585
	NP	12	34.69	4.423
% cover bank dead vegetation	EE1	8	3.667	0.729
	EE2	17	4.216	1.857
	EE3	20	0.7	0.298
	NP	12	7.333	3.015
% cover bank fine grasses	EE1	8	19.38	5.097
	EE2	17	27.2	4.424
	EE3	20	32.29	4.7
	NP	12	26.08	3.606
% Cover Bank Woody Sp	EE1	8	2.417	1.153
	EE2	17	1.412	0.662
	EE3	20	2.083	0.591
	NP	12	2.183	1.634
% cover bank Annuals	EE1	8	18.79	11.57
	EE2	15	17.53	7.538
	EE3	20	5.692	3.864
	NP	11	2.564	0.62
% cover bank Perennials	EE1	8	81.21	11.57
	EE2	15	82.47	7.538
	EE3	20	94.31	3.864
	NP	11	97.44	0.62
% cover bank injurious species	EE1	8	10.21	7.154
	EE2	17	6.716	1.454
	EE3	20	4.333	0.691
	NP	12	5.042	1.074
% cover bank invasive species	EE1	8	0	0
	EE2	17	0	0
	EE3	20	0.0333	0.0229
	NP	12	0	0
% cover bank nitrophilous sp.	EE1	8	4.042	1.469
	EE2	17	4.118	1.446
	EE3	20	3.842	0.885
	NP	12	4.139	1.036

Attribute	Option/NP	n farms	Mean	SEM
% cover bank bramble	EE1	8	1.917	0.747
	EE2	17	1.167	0.433
	EE3	20	1.158	0.365
	NP	12	0.461	0.195
% Cover Bank Scrub	EE1	8	0.917	0.823
	EE2	17	0.941	0.466
	EE3	20	0.725	0.262
	NP	12	0.361	0.22
% Cover Bank Trees	EE1	8	0	0
	EE2	17	0.118	0.0988
	EE3	20	0.6	0.502
	NP	12	1.694	1.664
% cover bank other	EE1	8	0	0
	EE2	17	0.0392	0.0392
	EE3	20	0.367	0.229
	NP	12	0	0
Mean num Desirable Species m^{-2}	EE1	8	1.742	0.483
	EE2	17	1.99	0.314
	EE3	20	1.732	0.251
	NP	12	2.732	0.721

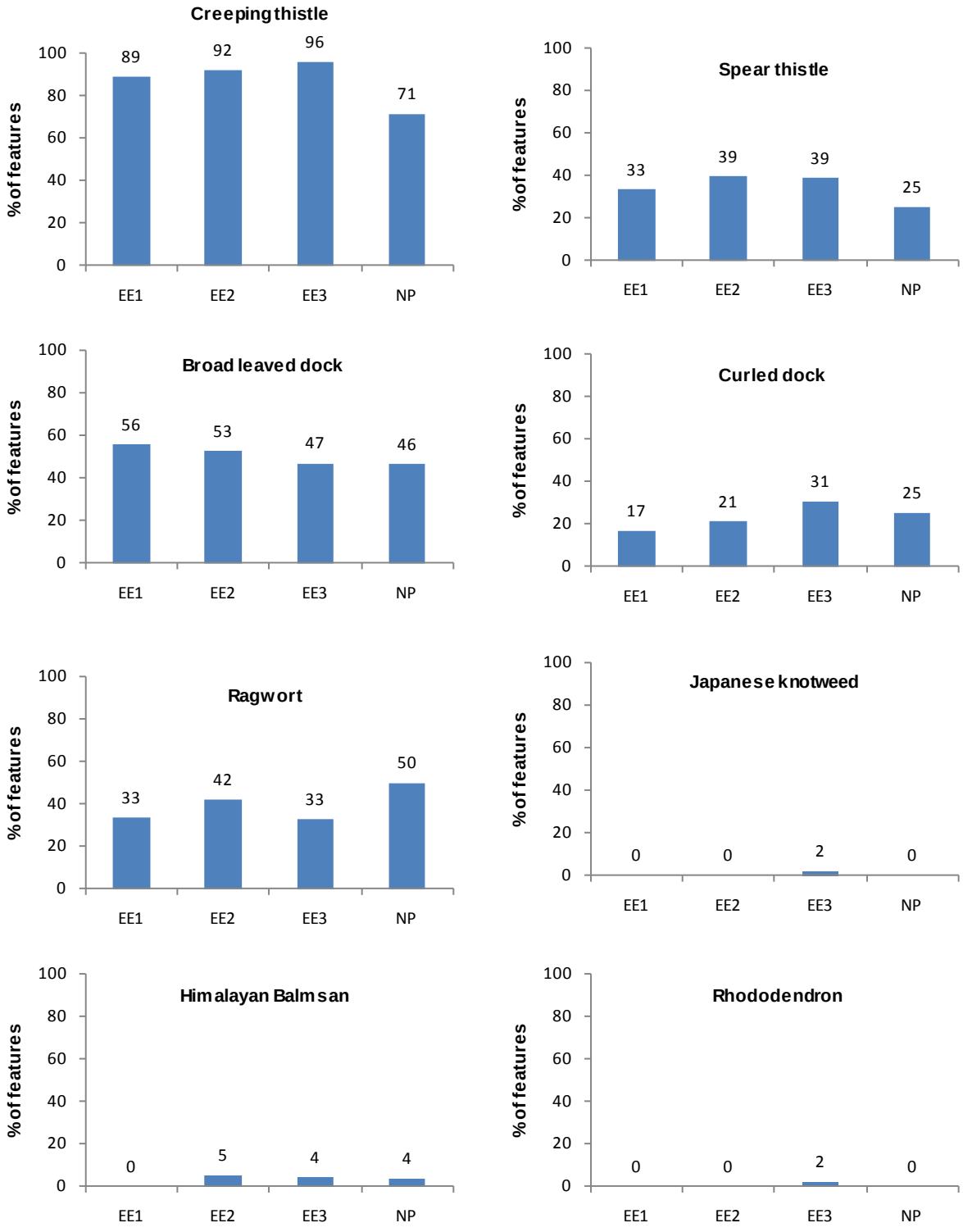

Figure 75. Proportion of features with positive answers for EE1,2,3 and non-participant farms.

Table 159. Summary of attributes for buffer strips on grassland (EE4,5,6).

Attribute	n farms	Mean	SEM
% cover coarse grasses	14	27.29	4.505
% cover dead vegetation	14	2.143	1.296
% cover fine grasses	14	37.63	5.81
% cover forbs	14	25.85	4.617
% cover bare ground	14	4.476	0.953
% cover woody sp.	14	2.619	1.564
Mean no. Desirable sp. m^{-2}	14	3.138	0.802
% cover annuals	14	1.976	0.522
% cover perennials	14	98.02	0.522
% cover bramble	14	0.714	0.361
% cover injurious sp.	14	3.952	1.34
% cover invasive sp.	14	0	0
% cover nitrophilous sp.	14	4.786	2.432
% cover other	14	0.857	0.857
% cover scrub	14	1.524	1.075
% cover trees	14	0.786	0.556
% Low vegetation incl. bare ground	14	25.8	7.997
Proportion of Vegetation Height 7 cm and under	12	2.403	1.064
Proportion of Vegetation Height over 7 cm	12	15.93	1.784

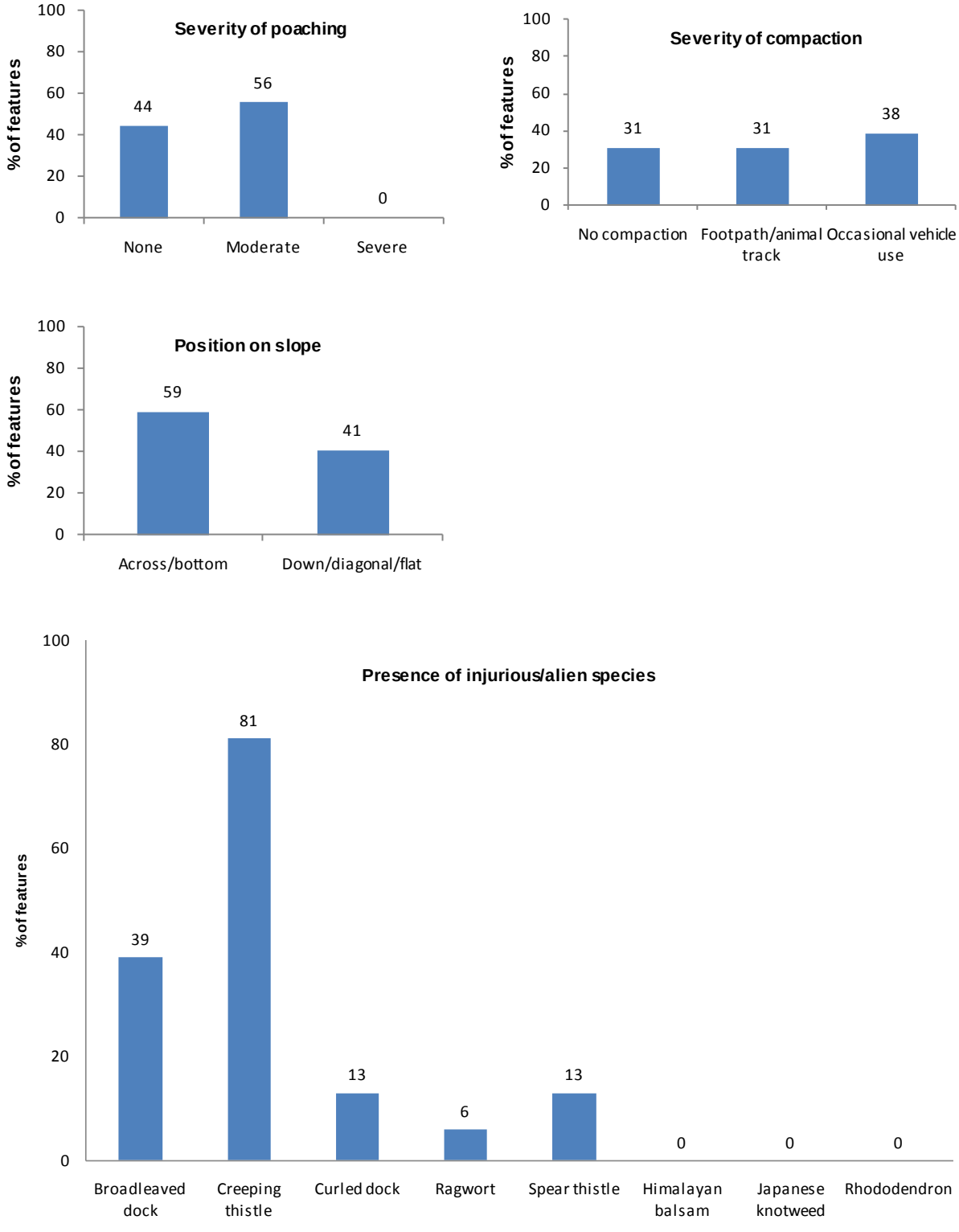

Figure 76. Proportion of features with positive answers for buffer strips on grassland (EE4,5,6).

Table 160. EE9 and non-participant buffer strips on arable land next to a watercourse.

Attribute	Option/NP	n farms	Mean	SEM
Average width of buffer strip	EE9	15	8.256	1.614
	NP	7	8.238	1.513
Mean num desirable forb sp.	EE9	16	2.558	0.479
	NP	7	3.171	0.932
% Cover Bare Ground	EE9	16	3.312	1.123
	NP	7	2.69	1.346
% Cover Coarse Grasses	EE9	16	36.12	3.39
	NP	7	38.36	9.963
% Cover Dead Vegetation	EE9	16	0.781	0.338
	NP	7	1.048	0.565
% cover Fine Grasses	EE9	16	34.65	6.078
	NP	7	29.86	10.93
% Cover Forbs	EE9	16	23.22	3.049
	NP	7	24.14	5.836
% Cover Woody sp.	EE9	16	1.917	0.538
	NP	7	3.905	3.531
% cover veg under 10 cm	EE9	15	14.57	7.689
	NP	7	16.9	9.424
% Cover Annuals	EE9	16	2.312	0.879
	NP	7	7.429	3.294
% Cover Perennials	EE9	16	97.69	0.879
	NP	7	92.57	3.294
% Cover Bramble	EE9	16	0.896	0.263
	NP	7	0.952	0.952
% Cover Injurious sp.	EE9	16	6.115	1.312
	NP	7	5.095	3.071
% Cover Invasive sp.	EE9	16	0.271	0.209
	NP	7	0	0
% Cover Nitrophilous sp.	EE9	16	5.104	1.411
	NP	7	5.381	2.69
% Cover Scrub	EE9	16	0.833	0.284
	NP	7	2.619	2.116
% Cover Trees	EE9	16	0.688	0.425
	NP	7	0.0952	0.0952
% Cover Other	EE9	16	0.146	0.125
	NP	7	0.238	0.238

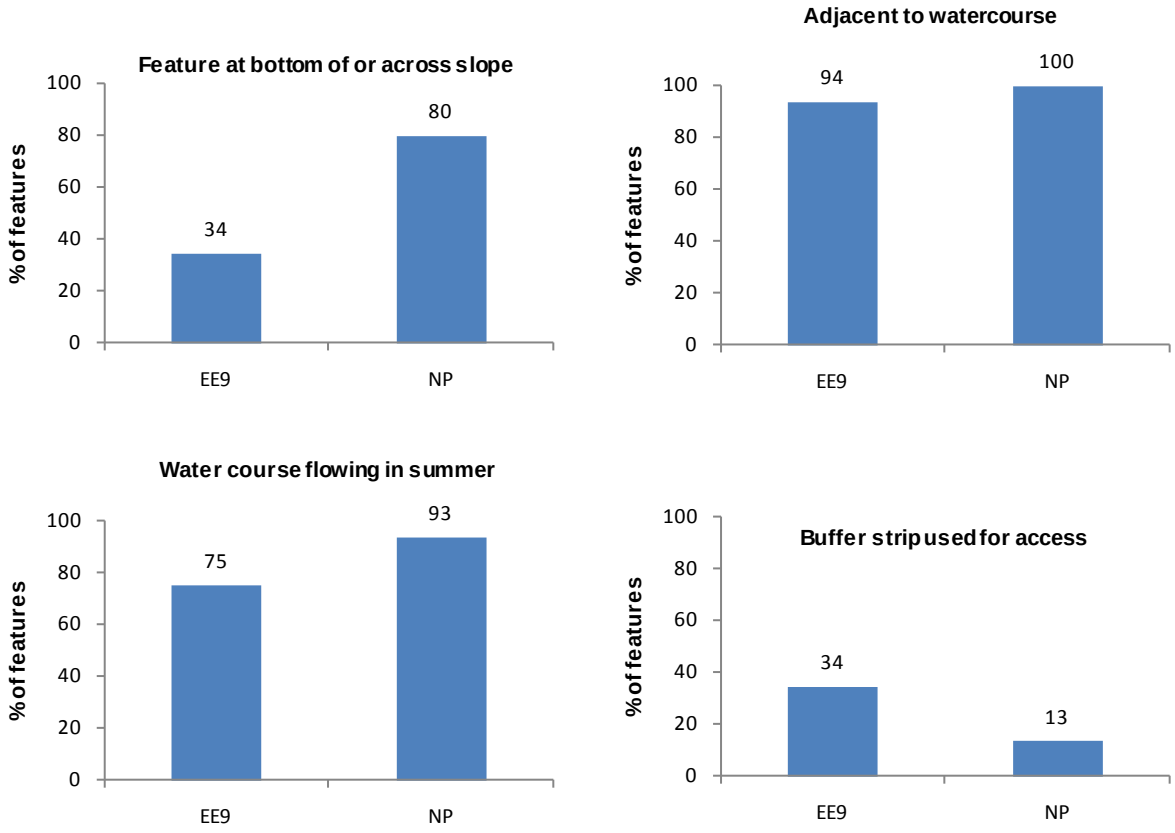

Figure 77. Proportion of features with positive answers for EE9 and non-participant farms.

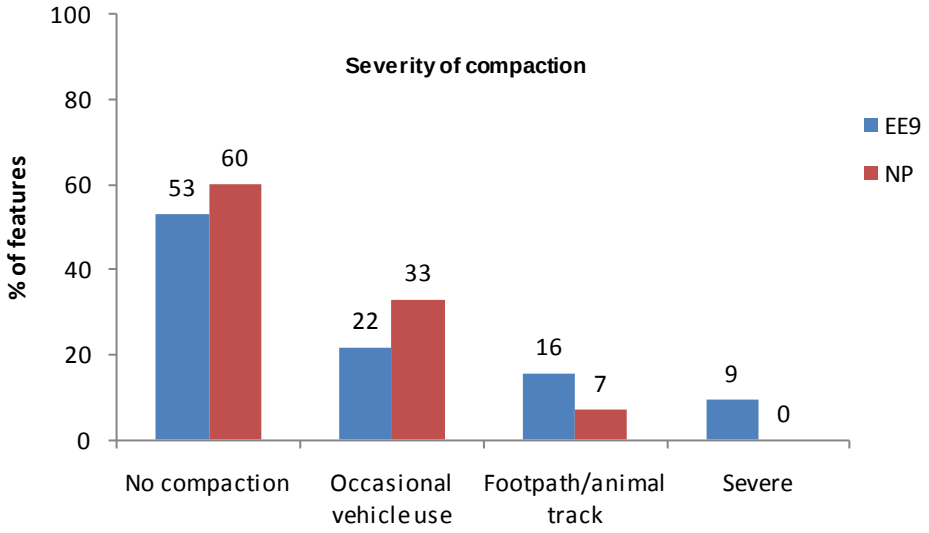

Figure 78. Proportion of features with different levels of compaction for EE9 and non-participant farms.

Table 161. EF1 and non-participant field corners

Attribute	Option/NP	n farms	Mean	SEM
Mean Num Desirable Forbs	EF1	41	2.337	0.261
	NP	8	3.871	1.099
% Cover Annuals	EF1	37	12.35	3.156
	NP	8	8.583	2.703
% Cover Bare Ground	EF1	41	4.85	1.024
	NP	8	2.833	1.833
% Cover Bramble	EF1	40	0.846	0.274
	NP	8	0.812	0.44
% Cover Cocksfoot	EF1	41	9.309	1.757
	NP	8	4.896	1.611
% Cover Coarse Grasses	EF1	41	30.98	2.703
	NP	8	28.15	5.694
% Cover Dead Veg	EF1	41	2.081	0.513
	NP	8	3.083	1.256
% Cover Fine Grasses	EF1	41	21.94	2.417
	NP	8	22.54	5.719
% Cover Forbs	EF1	41	27.65	2.776
	NP	8	36.19	6.357
% Cover Injurious sp.	EF1	41	9.61	1.762
	NP	8	6.625	1.619
% Cover Invasive sp.	EF1	40	0.117	0.0849
	NP	8	0	0
% Cover Nitrophilous sp.	EF1	40	2.508	0.427
	NP	8	3.854	0.981
% Cover Other	EF1	40	0.0917	0.0764
	NP	8	0	0
% Cover Perennials	EF1	37	87.65	3.156
	NP	8	91.42	2.703
% Cover Scrub	EF1	40	1.662	0.461
	NP	8	2.125	1.202
% Cover Trees	EF1	40	1.158	0.667
	NP	8	0	0
% Cover Woody sp.	EF1	41	3.191	0.79
	NP	8	2.312	1.184
% Cover Insect Pollinated Forbs	EF1	41	23.61	2.898
	NP	8	31.35	8.895
% Cover veg less than 10 cm high	EF1	40	10.09	2.796
	NP	8	4.875	1.495

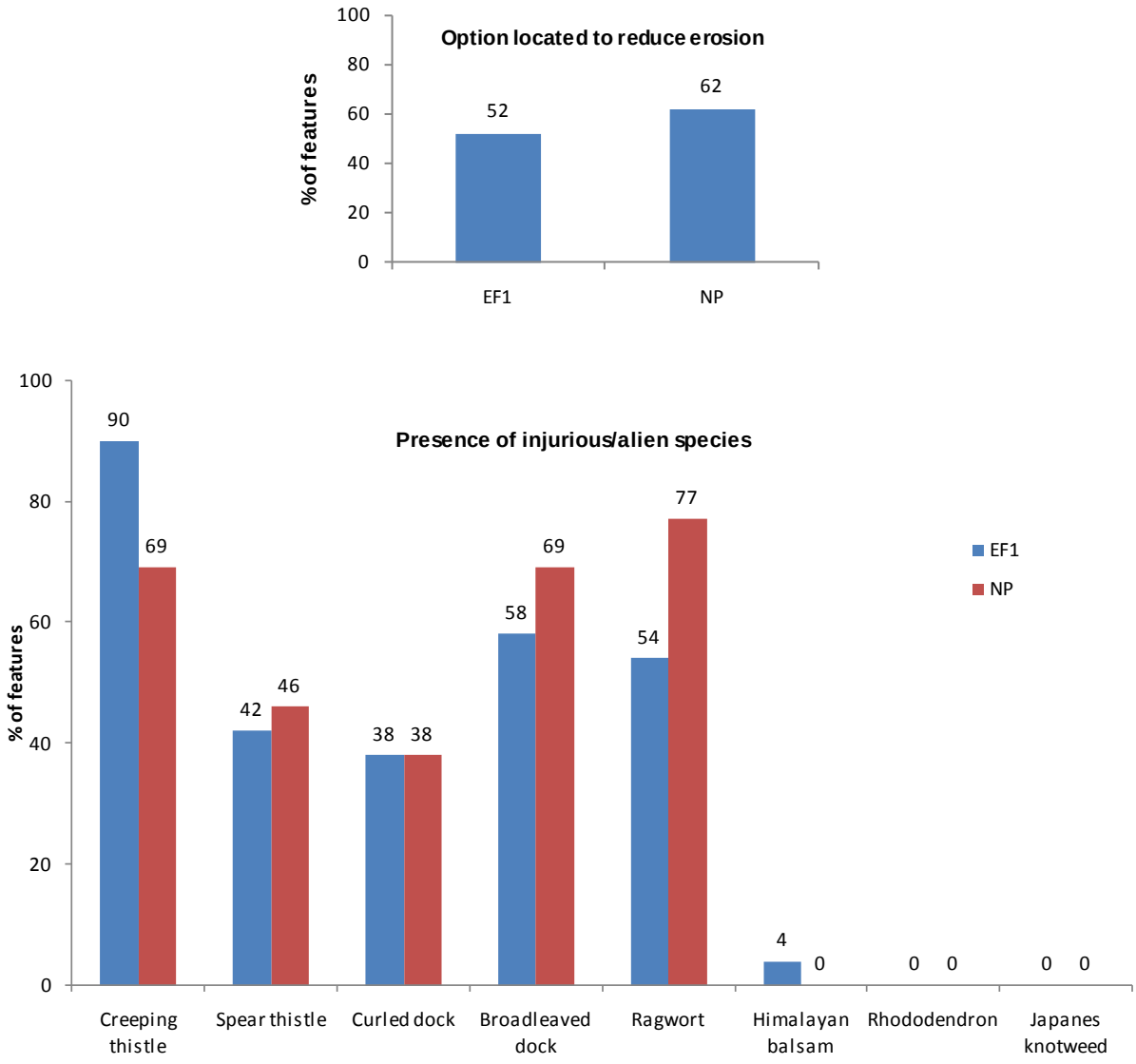

Figure 79. Proportion of features with positive answers for EE9 and non-participant farms.

Table 162. Summary of ground cover in wild bird seed mix.

% cover		n farms	Mean	SEM
	Area (ha)	17	0.614	0.114
total sown crops		20	31.98	5.98
other sown crops		20	7.942	3.307
bare ground		23	24.76	5.694
Cichorium intybus		20	0.0833	0.0833
dead vegetation		23	2.493	1.163
difficult weeds		22	4.205	1.507
Echinochloa crus-galli		20	0.05	0.05
Fagopyrum esculentum		20	0.192	0.175
Helianthus tuberosus		20	0.0833	0.0833
‘high value’ weeds		22	14.03	3.792
Humulus lupulus		20	0.05	0.05
injurious weeds		23	7.428	2.48
maize		21	3.524	2.317
Melilotus officinalis		20	0.433	0.433
other weeds		23	9.326	2.183
flowering/seeding		21	33.53	7.824
Phacelia		20	5.375	3.059
Phalariensis canariensis		20	0.125	0.125
Setaria sp.		20	1.75	1.402
sown barley		22	2.538	1.065
sown fodder raddish		21	1.492	1.2
sown crops kale		21	2.278	1.213
sown linseed		21	1.921	1.139
sown millet		21	3.333	1.346
sown mustard		21	4.627	1.689
sown quinoa		21	2.96	1.38
sown sunflower		22	0.879	0.384
sown triticale		21	2.865	1.499

Table 163. EK2,3 and non-participant grasslands.

Attribute	Option code	n farms	Mean	SEM
Height 7 cm and under (% of records)	EK2	58	33.19	3.978
	EK3	50	12.7	2.5
	NP	25	23.2	5.837
Num Sp present	EK2	67	40.51	2.339
	EK3	56	49.67	2.911
	NP	33	42.47	3.458
% area of compaction	EK2	67	0.925	0.272
	EK3	56	0.518	0.277
	NP	33	0.909	0.272
% area waterlogged	EK2	67	5.351	2.143
	EK3	56	7.723	2.498
	NP	33	6.424	3.09
% area poached	EK2	67	2.045	0.697
	EK3	56	2.304	1.146
	NP	33	1.485	0.719
% cover of trees/shrubs	EK2	66	2.136	0.585
	EK3	54	4.278	1.789
	NP	33	1.576	0.509

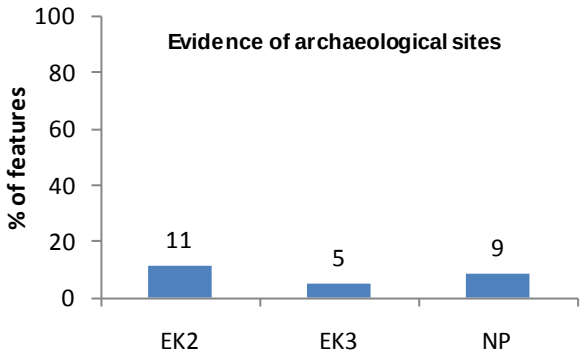

Figure 80. Proportion of features with positive answers for EK2,3 and non-participant grasslands.

Table 164. EK2,3 and on-farm control features.

Attribute	Option code	Option			Control		
		n farms	Mean	SEM	n farms	Mean	SEM
Num sp. present	EK2	32	37.38	2.752	32	39.81	3.258
	EK3	29	46.83	4.284	29	38.21	2.921
% area of compaction	EK2	32	0.906	0.436	32	2.063	1.579
	EK3	29	0.69	0.521	29	1.034	0.862
% area waterlogged	EK2	32	6	3.461	32	4.375	2.772
	EK3	29	12.86	4.533	29	3.586	2.771
% area poached	EK2	32	1.531	0.666	32	1.125	0.65
	EK3	29	1	0.541	29	0.828	0.358
% cover of trees/shrubs	EK2	32	2.688	1.123	32	3	2.191
	EK3	28	6	3.389	29	2.103	0.652

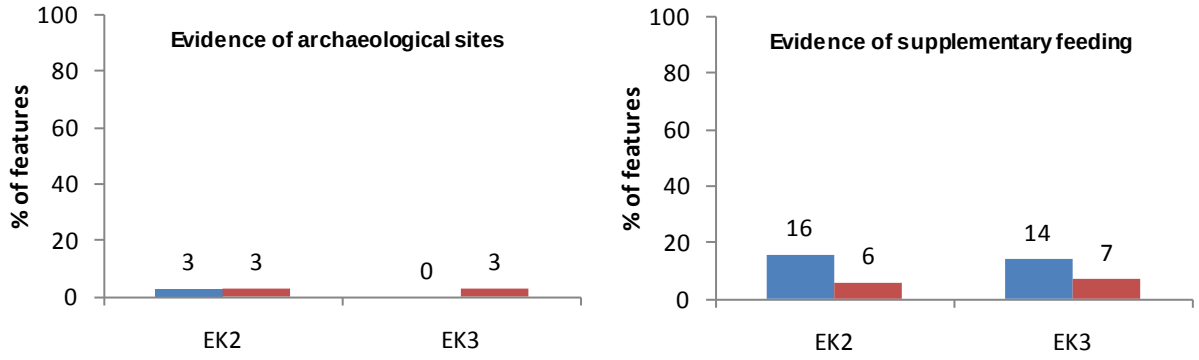

Figure 81. Proportion of features with positive answers for EK2,3.