The environmental effectiveness of the Higher Level Stewardship scheme; Resurveying the baseline agreement monitoring sample to quantify change between 2009 and 2016

Non-technical summary report
(see technical final report for full results and additional detail for findings summarised here)

S.M. Smart[1], M. Lobley[2], J.T. Staley[1], M.E. McCracken[1], H. Chiswell[3], J.W. Redhead[1], O.L. Pescott[1], M. Jitlal[1], S.R. Amy[1], H.J. Dean[1], L. Ridding[1], R. Broughton[1] and J.O. Mountford[1]

[1] NERC Centre for Ecology and Hydrology, Maclean Building, Benson Lane, Crowmarsh Gifford, Wallingford, Oxfordshire, OX10 8BB
[2] Centre for Rural Policy Research (CRPR) Lazenby House, Prince of Wales Road, Exeter, EX4 4PJ
[3] Countryside and Community Research Institute (CCRI), University of Gloucestershire Oxstalls Campus, Oxstalls Lane, Gloucester, Gloucestershire, GL2 9HW

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Natural England project officer: Andy Cooke

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This is a non-technical report for Natural England monitoring project ECM 6937, in which key findings for the project are summarised. Additional results that could not be included in this short summary are given in the full technical report, along with further details of the findings summarized here, including the results of statistical analyses and references. We recommend this summary non-technical report is read in conjunction with the full technical report:

J.T. Staley, M. Lobley, M.E. McCracken, H. Chiswell, J.W. Redhead, S.M. Smart, O.L. Pescott, M. Jitlal, S.R. Amy, H.J. Dean, L. Ridding, R. Broughton and J.O. Mountford (2018). The environmental effectiveness of the Higher Level Stewardship scheme; Resurveying the baseline agreement monitoring sample to quantify change between 2009 and 2016. Full technical final report. Natural England project ECM 6937.

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1. Introduction and background

Agri-Environment Schemes (AES) such as Environmental Stewardship are components of England's Rural Development Programme (RDP). Defra is required to evaluate activities delivered under its RDP using a monitoring and evaluation framework. This requires a range of monitoring activities designed to generate the required evidence. As such, rigorous monitoring of Environmental Stewardship is required to explore effectiveness, both in meeting desired outcomes and in use of public money. To provide the underpinning evidence, Natural England (NE), together with Defra, commissioned a baseline survey of the Higher Level (HLS) element of Environmental Stewardship from the NERC Centre for Ecology and Hydrology (CEH) in 2009 (Mountford et al., 2013).

This project builds on the baseline survey by undertaking a resurvey with two broad goals: (1) to appraise progress toward environmental outcomes since the baseline survey and (2) to assess how agreement holder characteristics affect the achievement of these environmental outcomes.

The approach used was designed collaboratively by CEH and the Centre for Rural Policy Research (CRPR) at the University of Exeter, focussing on effectiveness both at the agreement scale, and of the most important or widely applied HLS options. The core of the resurvey involved repeat monitoring of 173 agreements for which habitat extent and condition had been characterised during the 2009-11 baseline survey. In addition to analysing changes in field data between the baseline and resurvey, the approach also tested baseline assessments of agreement design and potential effectiveness made via expert appraisal panels (Mountford et al., 2013).

As well as looking at environmental outcomes, the project explored how AES outcomes can be affected by social factors. Past research by the resurvey project team (Lobley et al., 2013; McCracken et al., 2015) suggests that the quality of farmer engagement with their agreement influences the management and thus its likely success. This required structured face-to-face interviews with the agreement holders, which collected information on a) the history of agri-environmental management (both formal and informal); b) participation in relevant advisor and training events; c) overall understanding of the purpose of the agreement (selection and management of options as well as their delivery); and d) the overall commitment of the agreement holder to the HLS agreement, as well as gathering quantitative data about the nature of the agreement holder and their business.

1.1 Summary of baseline assessment of HLS

The baseline assessment of HLS found most agreements were well designed in relation to local and national HLS targets, although targeting could have been applied more strictly in some cases. The choice of HLS management options suggested few missed opportunities overall, although almost half the agreements had at least one mismatch between feature and option that could affect outcomes adversely. Following the baseline survey, a summary of findings for each agreement was assessed by an expert panel, and scores awarded for various aspects of agreement design, including the use of management prescriptions within specific options and the use of options across agreements. The panel appraisals reported five quite frequent problem areas in HLS option choice: 1) exaggerated quality of semi-natural grasslands, 2) vague objectives for options HK15-17, 3) poorly-justified woodland

management, 4) over-use of "more of the same options", and 5) HLS applied to semi-improved features of limited potential value.

Indicators of Success (IoS) were judged as the most often deficient element in agreement building, often due to generic indicator suites not being tailored to sites and IoS not being amenable to objective measurement. Frequent specific problems with IoS included: 1) woodland IoS too general, 2) identical IoS for restoration and maintenance options, 3) failure to account for variation in condition between parcels, 4) bog and flush areas in moorland not properly distinguished in the IoS; 5) poor or no linkage to the use of capital items; 6) IoS for SSSI features not linked to targets set in favourable condition tables; and 7) no requirement for IoS in "more of the same" options.

The timing of the baseline survey allowed detailed comparison with the results of the 2007 Countryside Survey (Carey et al., 2008). This comparison focussed on response variables derived from species attributes (*e.g.* Ellenberg indicator values and Grime indices) as well as species richness, grass:forb ratio and Ericoid cover. This evaluation allowed the baseline study to assess whether HLS agreements had been properly sited where the habitats and vegetation were of higher quality. Most habitats under HLS did indeed tend to be more species-rich, to have fewer ruderals and fewer indicators of fertility as well as better representation of stress-tolerant species. Evidence for effective agreement location was especially clear in woodland, improved and neutral grassland, bracken and arable land. However acid grassland, bog and fen/marsh/ swamp apparently showed a contrary trend, with HLS vegetation reflecting more fertile situations where competitors and ruderals had high cover.

The baseline assessment identified areas which would improve the implementation of HLS, relating to better targeted use and justification of options, more tailored Indicators of Success (IoS), clearer practical descriptions of management prescriptions and advisors having more training and flexibility to tailor individual agreements. HLS agreements poorly reflecting local opportunities were also picked up in two other independent assessments of HLS implementation in the same period (Boatman et al., 2014; Jones et al., 2015).

Almost 80% of HLS agreements were predicted as likely to achieve most desired outcomes in the baseline assessment, though with some significant weaknesses. Within these almost 30% of agreements were scored at a higher level of likely success (achieving all or most outcomes). These predictions of relative success or failure will be influenced by characteristics of the agreement holder, and are tested through the present resurvey.

2. Survey methodology

The resurvey included two main elements:

1) Field survey of 173 HLS agreements which had previously been surveyed in the baseline project (Mountford et al., 2013). The field survey collected a range of ecological data on land under HLS management including mapping habitat extent, undertaking condition assessment (CA) of features being managed, assessing cover and composition of vegetation and assessing progress against Indicators of Success (IoS).

2) A structured questionnaire survey of the agreement holders subject to the field survey, to collect information about their attitudes and approaches to HLS. This was designed to allow integrated analysis of environmental and attitudinal data.

2.1 Field survey

The main field survey in 2015 took place from mid-June to the first week of October, whilst in 2016, the field survey was undertaken from late March to early August, in part due to the need to survey areas of moorland where grouse shooting was a consideration before the breeding season. The field survey in 2015 addressed most of the lowland agreements, whilst in 2016 it included the upland agreement sample and the remaining lowland agreements. Additionally a bird survey was conducted in the intermediate winter of 2015/16, focussing on 28 agreements with options that are designed to provide winter resources for birds (HF12 and HK10).

Habitat mapping

Detailed and comprehensive mapping of Broad and Priority Habitats and linear/point features was undertaken at baseline. In the resurvey, the emphasis was on checking the baseline maps and recording changes since that survey.

Habitat condition assessments

Condition assessments of Farm Evaluation Plan (FEP) were undertaken to assess the effectiveness of the HLS management options. The FEP features assessed were the same as those assessed in the baseline survey, except for a minority of parcels under creation or restoration options where the main habitat feature had changed since the baseline survey. In such cases, surveyors specified the appropriate feature for condition assessment that was now present in the parcel. The condition assessment used the approach set out in the FEP handbooks (England, 2010), which involved categorising a number of criteria as passed or failed, from which condition was assessed as:

A = all criteria passed
B = one criterion failed
C = two or more criteria failed.

Where a condition of B or C was recorded, a note was made of which criteria the condition had failed on. An important caveat in interpreting these data is that in a few cases the outcome of an option may have been to change a FEP feature, such that it would become subject to a different suite of condition assessment criteria. This was only common under one

option (HK7), and condition results for features that changed between the two surveys have been reported separately.

Vegetation quadrats in lowland enclosed parcels

In lowland parcels, species-level vegetation data were collected in quadrats. These data were central to providing a quantitative assessment of any change since the baseline survey as a result of HLS options. Most frequently 5 quadrats were sampled per enclosed parcel, with more in larger areas and fewer in small patches of scrub and woodland. Quadrat sizes for lowland enclosed parcels varied with habitat type:

1 × 1m for grassland and arable margins
2 × 2m for heath and wetland
10 × 10 m for scrub and woodland.

Vegetation recorded at stops in upland unenclosed parcels.

In large open unenclosed habitats, plant species were recorded at 'stops', with the number of stops being greater in larger areas and with a minimum of 20 stops on each SSSI management unit. Species lists and the taxonomic resolution applied at stops varied according to the habitat feature present. Recording at each stop centred on a circle of 2m radius.

Indicators of Success

Indicators of Success (IoS) describe successful outcomes of management for each option/parcel combination within an HLS agreement. They are set by the NE adviser who sets up the agreement and are typically designed to be assessed in the second half and towards completion of the 10 year agreement (some IoS relate to the mid-point of an agreement). Most IoS could be measured, and were recorded as having been met, partially met or not met, or with their status uncertain.

Capital works

Capital works are a key element of many agreements, adding value to the annual management option payments, and often being integral to their success (e.g. sluices for managing water levels). As the resurvey took place after the original capital works programmes should have been completed, the resurvey recorded the presence of works in the surveyed parcels as well as evidence for their efficacy.

SSSI Common Standards approach

A SSSI condition assessment was undertaken where HLS options were placed on SSSI land. As these assessments often only covered part of a SSSI management unit they cannot be directly compared with the published condition, but enabled some additional analysis of whether SSSI designation was a factor in the effectiveness of HLS.

Survey of options for wintering birds

Winter bird surveys focussed both on observing bird usage and for arable options evaluating the establishment success of the wildlife seed crop. Two visits were made to each agreement,

the first of which took place between the end of October and mid-December 2015 and the second between January and March 2017.

2.2 Survey of agreement holders

The agreement holder survey was designed to develop understanding of how structural factors (e.g. farm size, type and tenure) and agreement holder perceptions are associated with environmental outcomes.

The agreement holder survey took the form of face-to-face interviews using a semi-structured questionnaire in order to generate a range of quantitative and qualitative data, including information on the farm business and its history of agri-environment management (both formal and informal), sources of advice, the agreement holder's understanding of the purpose of the agreement and its requirements, how they selected and managed options and their overall commitment to it. The design of the questionnaire was informed by previous successful questionnaires. The survey was undertaken by 8 interviewers and the questionnaire piloted with HLS agreement holders at 1 farm and 1 non-farm site, both in Devon. In all, a total of 137 face-to-face interviews were conducted representing an overall response rate of 80.1 per cent.

2.3 Data analysis approaches

Analyses of field survey data

Multivariate analyses of vegetation data (from quadrats and stops) were carried out both to describe the nature of and variation in plant communities in the baseline and resurvey datasets, and to investigate the impact of HLS management by assessing whether consistent shifts in plant community composition had occurred for particular types of HLS options.

Option scale analyses of change were carried out for condition assessments and vegetation response variables calculated from the quadrat and stop data, such as species richness or Ellenberg fertility indicator (Hill et al., 2004). The vegetation response variables analysed were chosen according to the objectives of the management option and the habitat to which it was applied – e.g. cover of sown species was relevant for some arable options, while species richness was used for analyses of grassland and woodland options. Covariates based on the agreement holder survey data, geographical variables such as altitude and environment zone, and predictive panel appraisal scores of how well each agreement was designed (allocated during the baseline), were included in option scale analyses as explanatory variables.

Analyses of all environmental data collected across all agreements were also made, to determine whether habitats under HLS management had changed between the two surveys, and in relation to the covariates described above.

Analyses of agreement holder survey data

A mix of qualitative and quantitative methods were used in analysing the data. Statistically significant associations were sought between variables and agreement holder typologies. A number of typologies were developed covering agri-environmental management experience, main motivation for participating in HLS, concerns with operation of HLS and overall commitment to agri-environmental management. A particular emphasis was put on the

association between agreement variables (such as perceived success of the agreement, attitude towards the scheme and likelihood of continuing a similar scheme in the future) and socio-demographic variables such as age, farm/non-farm status, agreement holder's role, educational attainment and so on.

In order to carry out meaningful analysis, options were grouped into broad categories of 'maintenance', 'creation', 'restoration' and arable option groups, depending on their purpose.

A counterfactual analysis of Countryside Survey and National Plant Monitoring Scheme data

A counterfactual comparison was attempted using data from Countryside Survey collected in 2007 (Carey et al., 2008) and National Plant Monitoring Scheme (http://www.npms.org.uk/) data collected in 2015 and 2016.

3. Changes in mapped habitats under Higher Level Stewardship management

Broad habitats

For the most extensive broad habitats found in HLS agreements there was relatively little evidence for change in extent between the baseline and resurvey. Seventy to ninety percent of mapped acid grasslands, dwarf shrub heaths, neutral grasslands and the arable and horticulture categories showing no change in habitat extent. Where change had occurred neutral grassland with scattered trees or scrub showed the biggest decline in habitat condition, with small changes towards bracken or broadleaved woodland indicating a failure to control succession, although it is worth noting that only 14 ha of this habitat was surveyed. Similarly, a small area (15 ha) of broadleaved woodland mosaic was surveyed, of which about 30% showed a change in extent which could be considered negative. The habitat with the largest proportion that changed to another habitat is bare ground with early succession, the majority of which changed to neutral grassland between the surveys.

Priority habitats

There was little change in extent of the majority of priority habitat surveyed. Where changes were recorded, these were predominantly positive for the majority of priority habitat categories. The key exceptions were lowland dry acid grassland, lowland heathland and lowland meadows, where a more substantial decline in extent and / or condition was recorded, largely due to a loss in extent of priority habitat.

Mapped habitats by HLS option groups

The extent of land under HLS options groupings that showed positive change was larger than the extent of land showing negative change. The largest areas of land surveyed were those under the HK grassland option group, and the HL ('moorland and rough grazing for birds') option groups. Within the HK grassland options, the largest change observed was from improved to neutral grassland. In the HL option categories, the largest changes were all towards acid grassland, from neutral grassland, bracken and broadleaved woodland. The next

largest positive changes observed in mapped habitat extent were towards bog, from both fen, marsh and swamp and acid grassland. In the largest broad habitat categories surveyed in both option groups (neutral grassland and calcareous grassland for HK options, dwarf shrub heath and acid grassland for HL options), over 80% of habitat remained in the same broad habitat.

Linear habitats

In the majority of cases, the length of linear features was unchanged between the baseline and resurvey.

4. Multivariate analyses of vegetation data

Multivariate analyses of plants species compositional data showed more instances of change in lowland, enclosed habitats than upland habitats. This may be partly due to differences in survey methods (quadrats in lowland enclosed habitats included estimates of percentage cover whereas in the uplands, presence at stops was converted to frequency data per parcel) and in replication, as more parcels were surveyed in several of the lowland habitats than in the uplands. Where changes were detected, they were weak yet positive effects suggesting prolonged management may yield stronger signals as more time passes.

Key changes found:

- Where lowland grassland creation was the objective, a move away from weedy disturbed arable or tall ruderal communities towards grassland communities was identified. This is also supported by a standalone analysis of HLS option HK8 (creation of species rich semi-natural grassland). For lowland grassland restoration options, small yet significant change was detected suggesting that some sites may have become slightly wetter, or have experienced a reduction in grazing pressure. For grassland maintenance options including HK6 (maintenance of species rich semi-natural grassland), there was no clear evidence of any marked change in species composition, as expected for maintenance options.

- For woodland maintenance option HC7, a very small but significant shift was observed which may indicate a move towards less disturbed woodland understoreys. Where woodland restoration was the objective (option HC8), small but significant changes were detected indicating a modest shift away from acid grassland and fen plant communities, but this was based on a small number of quadrats.

- For plant communities under a lowland heath restoration option (HO2), there was a small significant shift from grassier assemblages toward more distinctively heathland assemblages. Where lowland heath maintenance was the objective (HO1), there was also evidence of a shift towards more distinctively heathland communities.

- Where fen was being maintained (option HQ6) there was weak evidence of a small shift towards higher pH and possibly less eutrophic conditions. For vegetation managed under the fen restoration option (HQ7), there is some indication of a move to plant assemblages typical of wetter conditions.

- For vegetation managed under HLS lowland bog restoration option (HQ10), there was an indication that the plant communities may be becoming more diverse, which may reflect the development of bog structure (for example, the emergence of semi-natural hummock & depression micro-topography).

- All upland calcareous grassland parcels were under a moorland restoration option (HL10) and showed no evidence of change between the two surveys.

- The majority of parcels dominated by grass moorland were under an HLS restoration option, with just two parcels under a maintenance option. There was no clear evidence of change between the two surveys, but a possible indication of an increase in small scale topographic diversity.

- Upland heath parcels and those dominated by mires and wet heath were both evenly split between restoration and maintenance of moorland HLS options, and no evidence was found of change between the two surveys periods.

5. Changes in habitat condition and vegetation responses under HLS options(s)

Option scale analyses of change were carried out for habitat condition and vegetation response variables calculated from the quadrat and stop data, such as species richness or Ellenberg fertility indicator (Hill et al., 2004). The vegetation response variables analysed were chosen according to the objectives of the management option and the habitat to which it was applied – e.g. cover of sown species was relevant for some arable options, while species richness was used for analyses of grassland and woodland options. Covariates based on the agreement holder survey data, geographical variables such as altitude and environment zone, and predictive panel appraisal scores of how well each agreement was designed (allocated during the baseline HLS project), were included in option scale analyses as potential explanatory variables. A multi-model comparison process was used to provide an objective selection of those explanatory variables that related to change in each vegetation response variable

Overall the results indicated a small net gain to better condition classes. However, a positive change or stability in condition was more likely if the parcels were initially in a semi-improved state rather than less improved. This may be because condition improvement criteria are more stringent and difficult to achieve for the latter, especially for priority grassland habitats where establishment and restoration timescales can take longer than a ten year HLS agreement. Improvements in botanical variables were found for some priority grasslands, where condition had not changed sufficiently to lead to a higher rating at resurvey. Results for each option or pair of options analysed are summarised below (Table 1).

HK7 - restoration of species rich semi-natural grassland

27% of parcels in the top condition class A at the resurvey had moved up from a condition of B or C at baseline, while a further 35% had improved to condition B from a C at baseline.

54% of those parcels in the best condition were assessed at resurvey as in a lower condition class. However, almost half of the parcels surveyed (63 out of 150) were assessed in the same condition at both surveys. Fewer bottom conditions of C improved between baseline and resurvey for priority grasslands than for semi-improved grassland habitats. This was most apparent for lowland meadows, where all ten parcels classed as condition C in the baseline remained in the lowest condition category. Condition was analysed for those habitats that had remained the same habitat type between the two surveys, as the assessment criteria differ with habitat type. In addition to the changes above, nine parcels changed from a semi-improved grassland to a priority grassland habitat with greater conservation value (either lowland meadow or purple moor grass and rush pasture) between the two surveys.

Shifts towards less competitor-dominated communities in calcareous grasslands demonstrated some improvements in plant communities within priority grasslands between the surveys, even where condition did not change substantially. More parcels had an increase in sward height than a decrease between the two surveys, reflecting a reduction in grazing pressure. A significant association was detected between measured increases in cover of plants for pollinators at resurvey and the ease of implementing management as rated by agreement holders.

HK6 – maintenance of species rich semi-natural grassland

30% of parcels in condition class B or C at baseline moved up to condition A at resurvey, and a further 28% of those in condition C moved to a B. As for HK7, nearly half of parcels with condition B or C at baseline remained in the same condition at resurvey (27 out of 60). Lowland meadows had a reduced likelihood of condition improving between the two surveys than other priority grassland habitats, though more than half of the lowland meadows in condition C at baseline had a better condition at resurvey, unlike for HK7. The use of supplementary options, such as hay-making and cattle grazing, increased the likelihood of a positive change in condition.

Plant species richness increased between the two surveys in two-thirds of the parcels, and more if the habitat was a lowland meadow than other habitats. How much the plant assemblages changed between baseline and resurvey depended partly on the initial baseline value. Where the grass to forb ratio was initially low there was a reduced chance of a further decrease between baseline and resurvey. Similarly, cover of negative indicator plant species decreased more between surveys on parcels that had a higher cover of negative indicators at the start. This may indicate a greater opportunity for improvement of land in poor initial condition. The cover of pollinator friendly plant species increased more between the baseline and resurvey on parcels for which the management prescriptions had been classified as 3 or 4 (largely appropriate) during the baseline panel appraisals.

HK15 / 16 – maintenance / restoration of semi-improved or rough grassland for target species

20% of parcels assessed as in condition B or C at baseline moved into condition A at resurvey, and a further 54% of those in condition C at baseline moved into condition B. Over half of parcels in condition A at baseline stayed in condition A (57%). More parcels were in the lowest condition of C at baseline than resurvey, especially for HK15 (maintenance), for which more parcels were surveyed than for HK16.

The strongest factor linked to habitat condition was that of agreement holders scoring the ease of management as 5 (very easy), which resulted in an increased likelihood of a positive change in condition between surveys. Similarly, where agreement holders rated management prescriptions as easy to implement, then a reduction in competitive species and an increase in stress-tolerator species was more likely to have been seen. Although botanical diversity is often not the primary target of these options, this is indicative of a probable increase in wildlife value. Moreover, sites with higher woody cover at baseline were more likely to have a reduced woody cover between the two surveys.

HL9 / HL10 – maintenance / restoration of moorland

On these moorland options, 22% of parcels moved into class A from B or C between baseline and resurvey, and a further 19% of those in condition C moved up to a B. Only 25% of parcels were lost from a baseline condition of A to a lower condition, as the majority remained in condition A. However, a majority of poor condition (C) parcels at baseline remained in condition C at resurvey (20 out of 27). In most cases, the condition attributes failed were dwarf shrub heath cover and appropriate age structure, for these two options. Where panel appraisal scores had indicated poorly tailored or inappropriately used options this was associated with reduced likelihood of condition improvement.

Overall, Ellenberg fertility reduced slightly between the surveys for those parcels under management option HL9 and HL10 on agreements where agreement holders had rated the ease of management for these options as easy. However, whilst the cover of negative indicator species on the options as a whole did not change between the two surveys, there was weak evidence of a very small increase in the cover of negative indicators on blanket bog.

HC7 / HC8 – maintenance / restoration of woodland

38% of parcels in B or C at baseline moved into class A by resurvey, while a further 67% moved from C to B. 25% moved from A to lower condition classes, so the large majority remained in condition A. The likelihood of condition change appeared not to be related to starting condition or any other explanatory variables. However, where agreement holders assessed management prescriptions for options HC7 and HC8 as easy (scores of 4 or 5) Ellenberg moisture score increased between baseline survey and resurvey. As for options HK15/16, this indicates a greater chance of a positive response in the botanical community where agreement holders rate the management as easy. Multivariate analyses of the plant communities managed under HC7 showed a shift towards plant species typical of less disturbed conditions, which would be compatible with a reduction in grazing. Species richness increased between the two surveys in the easterly lowlands, potentially also as a result of less grazing disturbance. The evidence of change across these plant community attributes suggests that botanical communities managed under HC7 or HC8 are improving as a result of reduced grazing.

HF12 - Enhanced wild bird seed mix plots

Many of the arable options were not well enough established during the baseline for survey. Additional arable options were assessed during the resurvey, the most frequent of which was enhanced wild bird seed (HF12), which was surveyed for bird use and winter seed provision during winter 2015/2016. Average cover of sown species in HF12 plots was low (16%); 11 of

the 24 plots had less than 1% sown species cover so had failed, while over half of the plots had cover of sown species between 25 and 71%. There was also an average cover of 12% of unsown plant species, many of which have value in providing resources for pollinators and seed for birds. Seed availability was depleted by the second winter visit (in January – March 2017). Winter seed provision did not relate to any of the covariates tested. Despite not being the main objective of this option, botanical diversity in summer was found to relate to ease of management as scored by agreement holders. Unlike the woodland and grassland options, those agreement holders who rated HF12 management as easy had plots with a lower plant species richness. However, fewer examples of HF12 were surveyed than for grassland and woodland options, and botanical diversity is not the main objective of this option.

Table of key changes in condition and plant community variables between surveys, by option(s), continued below

	HK7	HK6	HK15 / HK16	HL9 / HL10	HL8 / HL7	HC7 / HC8	HF12
Condition of habitat feature	Improved for semi-improved grassland, not for priority grasslands	Improved between surveys, not for lowland meadows. Increase more likely if supplementary option also applied	Improved where AH rated management as easy	Majority at condition C at baseline did not improve. Initial condition related strongly to outcome.	No change	No change	NA
Change in habitat feature	9% of parcels changed habitat; majority from semi-improved to species rich grasslands	10% of parcels surveyed changed habitat; no pattern to changes	2% of parcels surveyed changed habitat	4% of parcels surveyed changed habitat between surveys	Habitat changed on 1 parcel	8% of parcels surveyed changed habitat	NA
Plant species richness	Increased in majority of parcels, more likely if supplementary option also applied	Increase for lowland meadows, increase more likely on higher quality agricultural land	Increased in westerly lowlands and on some priority grassland habitats.	NA	NA	Increase in easterly lowlands, increase where supplement added	Lower where AH rated management as easy
Ellenberg fertility	No change	Decreased slightly on priority and species-rich grasslands	Decreased in westerly lowlands (towards plant communities typical of less fertile soil), decreased on G15 grassland	Reduced where AH rated management as easy	NA	Relates to slope and option identity	NA
Ellenberg reaction	No change	Small shift to plant communities of more basic soils, in English uplands only	Decreased in westerly lowlands (towards communities typical of less basic / more acidic soil)	Reduced where AH rated management as easy.	NA	Increase in northerly uplands, relates to slope	NA
Ellenberg moisture	No change	No change	Increased on G15 grassland	Reduced where supplementary option also added	NA	Increased where AH rated management as easy	NA
Grime competitive attribute	Lowland calcareous grasslands – reduction in competitive species	No change	Reduction in competitive species where AH rated management easy	Increase feature other	NA	No change	NA
Grime ruderality attribute	No change	No change	Decrease on G15 grassland	Decrease AH rated management as easy, also if supplementary option applied, and in blanket bog	NA	No change	NA
Grime stress-tolerator attribute	No change	No change	Increase where AH rated management as easy,	Decrease feature other	NA	Decrease in uplands	NA

			also increase in westerly lowlands and on semi-improved grasslands				
Grazing tolerance	Reduction in grazer tolerant species in lowland calcareous grasslands and purple moor-grass and rush pastures	Decreased where AH rated management as easy. Decreased on lowland meadows.	Increased where agreement holders categorized management as easy	NA	NA	Data very variable, no clear result.	NA
Grass to forb ratio	No change	Increased on steeply sloping parcels	Increase on G15 grassland	NA	NA	Decrease AC	NA
Negative indicator species cover		Decreased more on smaller parcels	NA	Little change, weak evidence for increase on blanket bog	NA	*Positive indicators relate to baseline; slight decrease where baseline cover high (negative indicators NA)	NA
Woody species cover	Increase related to addition of supplement, decreased where prescriptions rated appropriate in BPA.	No change	Increase where AH rated management as easy, reduced more where woody cover was greater at baseline	*No change	NA	No change	NA
Sward height	Increased, more for swards that were taller at baseline	No change	No change	No change	NA	NA	NA
Cover of pollinator friendly plants	Increase where AH rated management as very easy	Increased where prescriptions rated appropriate in BPA.	No change	NA	NA	Increase between surveys	NA
Cover of sown species	NA	NA	NA	NA	NA	NA	<1% in 46% plots, >>25% in majority
Maintenance and restoration options differ?	NA	NA	No	No	No	Yes for 1 variable; change in Ellenberg fertility	NA

Table 1 Summary of main findings from analyses of changes in condition and plant community variables between the surveys, by option or option pair. Trends are derived from generalised linear or generalised linear mixed models fitted to data collected in the field. AH = agreement holder. BPA = baseline panel appraisal, G15 = coastal and flood plain grazing marsh habitat – BAP habitat. *Cover of dwarf shrub cover analysed for HK9 / HL10 rather than woody species cover, positive indicator cover analysed for HC7 / HC8 rather than negative indicators. NA = variable not analysed / not applicable for that option / option pair.

6. Indicators of success and capital works

Achieving Indicators of Success

Of all IoS that were assessed, 63% were achieved, 9% were judged to be partially met and 28% failed. These rates are similar to two other recent assessments of HLS performance (Boatman et al., 2014; Jones et al., 2015).

IoS for maintenance and restoration of species rich grassland options, HK6 and HK7, were assessed at 59% and 57% successful respectively. Greater success rates were achieved for the grassland options, HK15 and HK16, with 60% and 68% of IoS met at the time of resurvey. The allocation of inappropriate FEP features to grassland management and the issue of grassland quality being overstated in the FEP resulting in setting overambitious targets and/or using inappropriate options were highlighted in the baseline survey and were judged likely to be a factor in any failure to deliver desired outcomes.

A greater proportion of IoS for moorland options were achieved with HL9 and HL10 both having more than 72% IoS fully met at the time of resurvey and with HL8 achieving 65% success. However, only 40% IoS were fully met for option HL7 (maintenance of rough grazing for birds), with roughly half of the IoS relating to sward height not met. Vegetation on failing parcels of this option was often too short, and covering too much of the area for the parcels to meet the IoS. This suggests a failure to deliver effective grazing management.

IoS for the hedgerow management options HB11 and HB12 were often fully met (86% and 91% respectively). The IoS criteria for these options are set in a way that is more similar to measures of compliance than many other options, and a high success rate may reflect a tendency by agreement holders to find it more straightforward to comply with a prescription than to meet an ecological target.

53% of IoS for woodland management were not met. There is evidence to suggest this may partly reflect the tendency for IoS for woodland management to be too general and in some cases inappropriate.

For options designed to provide winter resources for birds, IoS often require sightings of target species. Whilst such species-specific IoS are useful, they are dependent on sightings and it may often not be feasible to make an assessment based on one or two visits.

For archaeological and historical features, many IoS were categorised by surveyors as ‘could not assess’ (53%). IoS for such features often address deterioration of specific archaeological structures within fields or below ground. Historic feature IoS concern protection and lack of deterioration of ancient field boundaries and features such as ridge and furrow.

Confidence in achieving IoS per option

Within the agreement holder survey carried out by CRPR (See Section 7), agreement holders were asked “How confident are you that you will achieve your Indicators of Success for the following options in your HLS agreement?” for each HLS option on their agreement. These were then looked at in relation to IoS achievement.

Maintenance and restoration of species rich semi-natural grassland (HK6 and HK7)
For these species-rich grassland management options, agreement holders' confidence in achieving IoS was not always reflected in the outcomes seen. Indeed 69% of those who were certain of meeting their IoS actually had IoS categorized as 'not met' in the resurvey.

Maintenance / restoration of semi-improved or rough grassland for target species (HK15 /16)
For the management of grassland for target species options, there was no significant relationship between confidence and IoS achievement.

Maintenance / restoration of moorland and rough grazing for birds (HL7 / HL8/ HL9 / HL10)
29% of IoS were not met despite certainty they would be met. Many of the IoS that were not met for these options and where the agreement holders were certain that IoS could be achieved, were of the IoS types listed as having high instances of being set at an inappropriate level or being an inappropriate type of IoS e.g. positive indicator types.

Maintenance / restoration of woodland (HC7 / HC8)
Agreement holder confidence in achieving woodland IoS was much lower, only 21% were certain the IoS would be achieved, out of these 69% were actually achieved.

Enhanced wild bird seed mix plots (HF12, HF13 and HF14)
For these arable options, 33% of agreement holders felt certain they would meet their IoS but of this fraction 61% of IoS were actually not met. This may reflect the challenge faced by some agreement holders in fitting environmental options alongside existing arable practices.

Capital items

The majority (83%) of capital works had been completed on time or had been started by their HLS deadline. Of the agreement holders interviewed 86% considered capital items as essential or important to their agreement's objectives.

SSSI

SSSI condition assessments made under this project are not necessarily comparable to common standard monitoring methodologies due to differences in scale. Only SSSIs that were covered by parcels within resurvey agreements were surveyed.

The frequency of positive and negative indicator species were common attributes across different SSSI habitat types. Data show that some SSSI habitat types, e.g. CG2 Grassland meet favourable condition criteria of at least two positive indicators frequent and two occasional, whilst others do not, e.g. MG4 habitats. All SSSI habitat types had some presence of negative indicator species, the most frequent were ragwort (*Senecio jacobaea*) and *Urtica diocia.*

7. Agreement holder interview results: Results from the CRPR survey

Previous agri-environment schemes

Just over 72% of agreement holders had previously participated in an agri-environment scheme (AES). Participation in previous schemes had been motivated by a variety of factors although financial motives dominated. The significance of financial motives reflects the findings of much previous literature on AES. An 'interest in wildlife and/or the environment' and the fact it 'fit with the pre-existing farming system' were also particularly significant motivating factors (mentioned by 51.0 and 45.6% of survey participants' respectively).

Nearly 50% of agreement holders perceived 'significant environmental benefit' from their previous AES. Generally, those that claimed to have seen **no/little environmental benefit** from previous schemes suggested it was because they had already been maintaining the environment. They were not particularly critical of previous scheme but felt they did not elicit any environmental benefits beyond what they were already doing.

Deciding on Higher Level Stewardship

The majority of participants reported that they had been very keen to participate in HLS with 80% of agreement holders stating that HLS was something they 'definitely wanted to do'. The smallest agreements were the least likely to be associated with a strong financial motivation. They were also the most likely to be motivated by the practical fit of HLS requirements. Given that the total financial return will be limited on small areas of land, the 'goodness' of fit with the existing systems is understandably important as a motivation. Conversely, the operators of the largest land holdings were more likely to be strongly motivated by either financial concerns or highly altruistic factors, reflecting the greater financial gains associated with larger agreements, but also an acute awareness amongst agreement holders on larger farms/sites of the potentially significant environmental impact of their work/practices.

Negotiating and choosing HLS options

That 'the features were already in place' and 'options would enable us to increase the wildlife' were the most popular reasons for choosing HLS options. These were identified by 76.5% and 75.7% of participants respectively (Table 35). Also highlighted by more than half of participants, was the benefit that aligned 'management was already in place'

Opinions varied regarding the agreement negotiation process. Some felt they were in complete control while others felt excessive pressure to comply with the views of the NE advisor. However, only 4% said that the agreed prescriptions were not suitable for their land. The major reason for deeming options suitable was that they fitted in well with existing management and their vision for their land.

Capital works

The majority of surveyed agreement holders with capital works as part of their agreement reported that they had been chosen because they were essential to the delivery of agreement

objectives or were beneficial to the farm. A significant minority (37.5%) reported that they were going to do the capital works anyway.

There was a wide range of views about the viability and ease of implementation of capital works. Some thought the grants very generous. Others, while recognising the benefit of the works, stated that grant only covered a small fraction of the real cost. Flexibility around the implementation of capital works was seen as highly desirable.

Implementing the agreement: options level analysis

Maintenance options

55% reported feeling "certain" of achieving implementation of maintenance options largely because this meant doing more of the same.

Restoration options

Only 36% of agreement holders claimed to be "certain" of achieving IoS for restoration options. Analysis indicated that these options had been harder for agreement holders to implement and obvious signs of success were less visible. When asked about the difficulty and uncertainty around achieving IoS for restoration options, agreement holders attributed it in part to restoration options demanding change and 'upheaval' of what they were already doing. Generally, restoration options presented more of a challenge to agreement holders and required more and sometimes significant action, often working to rectify years' worth of damage or degradation of the feature.

The diversity of the outcomes for restoration options versus the "prescriptive" and "narrow" nature of the IoS was a source of contention for some agreement holders. Some agreement holders claimed to be unable to see any progress with their restoration options. There are several potential explanations for this. It is possible that IoS are not being delivered due to poor initial targeting or insufficiently interventionist management; on the other hand it may sometimes be difficult for the agreement holder to recognise success for which poorly drafted IoS may be a factor or indeed it may be that significant progress with restoration is difficult to achieve within the span of an agreement.

Creation options

Nearly 60% of agreement holders were certain about achieving IoS for creation options, and a further 23.9% claimed to be fairly confident. Like maintenance options, creation options were seen as achievable by many agreement holders just by doing what they would be doing anyway. This was often conveyed as being a normal part of 'good farming/land management' or a case of building on what they were already doing, as one farmer put it "all we have to do is plough it up and put the seed in – it's easy."

Ease of implementation of options

In addition to exploring agreement holders' confidence in achieving the IoS, we also explored how easy or difficult they thought this would be. Under half of agreement holders claimed to find restoration options either very easy or easy (45.8%), compared with nearly two-thirds of agreement holders (65.5%) in relation to maintenance options, 55.9% of agreement holders in relation to creation options and 62.8% of agreement holders in relation to arable. This suggests that agreement holders perceive restoration options not to be as easy to implement as maintenance, creation and arable options. As above, this reflects the demanding nature of restoration options. Nearly 56% of agreement holders found creation options either very easy

or easy (e.g. planting and fencing off woodland) and yet a notable almost one-fifth (19.6%) found creation options either difficult or very difficult. As was the case with other types of options, external factors such as the influence of the weather and vulnerability to weeds hindered progress with creation options. Although 37.2% of agreement holders undergoing arable options found them very easy and an additional 25.6% described them as easy, almost one-fifth (18.6%) found them very difficult and a further 4.7% described them as difficult.

The greatest level of confidence in achieving implementation related to moorland and upland rough grazing, and options for boundary features. Least confidence attached to options for trees, woodlands and scrub but even here c.75% felt certain or fairly confident of implementation.

Perceived impact of the HLS agreement

- Nearly 72% of participants reported that their HLS agreement had either 'some' or 'a lot' of impact on wildlife.
- A total of 64.3% stated their agreement had either 'some' or 'a lot' of impact on landscape character.
- 53.7% of participants felt their agreement had 'no' or only a 'small amount' of impact flood risk management
- 58.5% of participants claimed their agreement had 'no' or only a 'small amount' of impact on access for farm work. In contrast, 55.4% of participants recognised 'some' or 'a lot' of impact on farm access for the public.

Most agreement holders thought that overall their agreement was successfully meeting its environmental objectives. Agreements that were perceived to be successful were more likely to be those where the agreement holder felt they had complete or considerable control over the design of their agreement (Table 7.47). In turn this suggests a greater understanding and 'ownership' of the agreement which may be associated with greater effort and care in the implementation of the agreement. This is a significant finding in the context of future schemes and broadly suggests that agreements are more likely to be perceived successful from the perspective of the agreement holder when they have had good levels of control or ownership when shaping/designing their agreement.

Agreement holders' concerns and suggestions for improvement

29.9% of agreement holders were principally concerned with the lack of flexibility the scheme offered and contended that the scheme doesn't always work at certain points in time (e.g. during periods of bad weather) or in certain locations (e.g. certain topographies, soil types etc.). They may feel that NE need to trust them (more) to make decisions/interpret management prescriptions more flexibly and felt the scheme might have worked better if they were able to do so.

The primary concern of a further 28.5% of agreement holders was that better feedback and easier communication with NE advisors was needed.

26.3% of agreement holders were primarily concerned with the ways in which the scheme was administered. This was often described as 'red tape' or 'bureaucracy'.

It was the largest farms/sites that were most likely to have suffered from a perceived lack of contact with NE (35.9%). This is perhaps understandable as larger or more complex agreements might be expected to have a wider range or greater frequency of issues arising that require more input from NE. Smaller agreements (under 50ha) were most likely to have experienced difficulties/issues with the administration and application processes associated with HLS than any other issues.

Looking to the future nearly half (47.8%) of participants stated that they would 'definitely' enter a similar scheme after the end of their current HLS agreement. On the other hand, one third of participants reported that they would 'definitely' carry on similar work in the absence of a formal scheme. This differential indicates that a lack of funding for formal AES in the future would be associated with lower levels of environmental management and quite possibly lower levels of commitment to what management was undertaken. The importance of the financial reimbursement associated with the scheme was again clear, with 41 of the 105 agreement holders saying that they would definitely or quite likely join a similar scheme referencing financial reasons. Another influential factor amongst those definitely or quite likely to enter a similar scheme in the future was a generally good overall experience of HLS. A total of 24 out of the 105 'definite' and 'quite likely' agreement holders referenced a generally positive experience of the scheme.

Agreement holders that recognised the environmental success or benefit of their agreement were more likely to want to carry on a similar scheme in the future than those who deemed HLS as neither successful nor unsuccessful, unsuccessful or very unsuccessful (79.8% vs. 58.8%). This suggests that helping agreement holders to recognise the environmental benefits of their work has the potential to increase interest in future/successive schemes. Farmers, in particular, are very good at recognising agricultural success but may be less well placed to recognise environmental success.

A statistically significant association emerged between future plans and number of years managing the agreement land; nearly two thirds (74.2%) of negative responses (unsure, unlikely and definitely not) were from agreement holders with over 20 years' experience. Conversely, 100.0% of agreement holders under the age of 35 were 'quite likely' or 'definitely' planning to continue a similar scheme in the future.

The impact of no AES funding

Ultimately, responses to this question highlight the potentially significant reduction in environmental work should AES no longer exist. This equates to a potential loss of environmental practices on 13,541ha or 28.64% of the survey area. Financial viability emerged as the bottom line for many agreement holders.

8. Agreement-scale results: assessing effects of ecological and agreement holder variables on condition and indicators of success across whole agreements

Indicators of success (IoS) at resurvey, habitat condition and four vegetation response variables were analysed across multiple HLS agreements, to explore which factors might most strongly explain change in HLS habitats over time.

For IoS, the second best-fitting model included a score attributed to each agreement during the baseline for how well options had been matched to features (Table 8.1). A score of 1 or 2, indicating mismatches between options and features, reduced the likelihood of IoS being achieved. This confirms the importance of initial agreement design, targeting appropriate features with suitable management. The next best-fitting analysis for IoS included a covariate to define whether SSSI designated land was present on the HLS agreement (Table 8.5). Agreements including SSSI land had a slightly greater likelihood of IoS being met than those without SSSI land present.

Analyses of change in condition between the baseline and resurvey have shown that initial condition and baseline habitat feature group are the main factors in the successful outcomes observed. Parcels in condition A or B at the baseline had a greater likelihood of attaining a successful outcome for condition at resurvey than those initially given a C. The habitat feature group was also retained in the first and third best-fitting regression analyses of condition. Where habitat feature was a grassland priority habitat, there was a reduced likelihood of an improvement in condition, perhaps because there was less ecological scope for enhancement with marginal improvement subtle and more difficult to detect. This result could be interpreted as showing the importance of targeting appropriate and realistic management at the right habitats. However, the timescales required to restore grassland to priority habitat status have been shown elsewhere to be much longer than the 5-6 years between these two surveys, highlighting that for challenging conservation outcomes longer term commitment is needed.

Species-richness differed between the two surveys. In neutral grassland (the reference broad habitat used for analyses Table 8.1 of main report) and the majority of broad habitats, it was on average higher at the resurvey than the baseline survey. It did not change between the two surveys on calcareous grassland and arable habitats. Average Ellenberg fertility attribute (weighted by percentage cover) was slightly lower at the resurvey compared to the baseline, for neutral grassland, woodland, dwarf shrub heath, arable and improved grassland. This would seem to indicate a cross-habitat signal of less intensive management. No change was detected for bog, calcareous grassland and acid grassland but this may reflect the inherently lower fertility that would be expected to be associated with these less productive habitats.

9. A counterfactual analysis of temporal change across CS (2007) and NPMS (2015/16) plots

We attempted to build a counterfactual assessment of vegetation change in land that was not in higher level AES by joint analysis of vegetation quadrats from Countryside Survey in 2007 and from the National Plant Monitoring Scheme in 2015/16. This analysis was substantially weakened by the change in surveillance schemes. This meant we were unable to track change in the same plots over time and this was compounded by designed differences in methodology and habitat targeting between the two surveys.

As a result of these differences in design, very few valid comparisons could be made. The most successful comparison was of quadrats in broadleaved woodland. Here, lower species richness in NPMS plots compared to CS contrasted with locally increased species-richness under HLS woodland options. Hence, for broadleaved woodland this provides tentative counterfactual support for the effectiveness of HLS options.

The project highlights the difficulty of identifying and assessing robust counterfactual scenarios. This is particularly the case where a scheme such as HLS targets the highest value habitats and as a result a high proportion of the habitat resource may come under management, and that part of the resource which does not may not do so because for one reason or another it is ineligible.

The most effective counterfactual analysis we could have delivered would have required a repeat survey of selected Countryside Survey quadrats. This could provide a sensitive and robust counterfactual for some, more widely distributed habitats (e.g. woodland, hedgerows, acid and neutral grasslands), especially at Broad Habitat level. This is because Countryside Survey targeted farmland habitats across England based on an unbiased, representative sampling design and vegetation change over time can be tracked at exactly the same quadrat locations and compared to repeat surveys of agreement land. However, even here, because of its random sampling approach, the CS sample significantly under-represents some Priority Habitats, and therefore may not enable a fair comparison for these sites.

The NPMS focusses explicitly on less common Priority Habitats and so provides the potential for monitoring counterfactual changes where these are well sampled over time. The geographic and ecological biases inherent in NPMS mean that the population represented by the sample will need careful definition and results interpreted accordingly. With sufficient dispersion of NPS samples, weightings could be introduced to account for such biases. Where samples entirely miss particular parts of the range of a habitat type then inference will be more spatially and ecologically constrained.

10. Discussion and recommendations

The results presented in the previous sections show that the effects of HLS management on habitats and plant communities are complicated. Detailed analyses of a range of drivers, at different scales and on multiple variables, were required to characterize these effects.

The majority of land under HLS management did not change in habitat type or extent between the two surveys. Where change did occur it was often positive and consistent with HLS objectives, though small losses of some priority habitats were also found.

Whether habitat condition improved between the two surveys depended on the habitat feature and option under which the land was managed. For example, change in condition was less likely for species rich semi-natural grasslands (including priority habitats) than for grasslands under management that targets other taxa. Analysis of change in condition across all agreements and habitats confirmed that habitat type and condition at baseline were the strongest drivers of whether condition improved between the two surveys.

Analyses of the plant communities under HLS management found little evidence of change between the two surveys, including all the upland habitats surveyed. Where changes in botanical response variables were shown, these were largely positive in terms of conservation objectives, though the many variables showed no change. Some of the changes found within lowland plant communities indicated a positive change (e.g. a reduction in competitive species for some priority grasslands), though not always to the extent of meeting a threshold for higher condition rating. The larger scale analyses across all agreements and habitats surveyed showed an increase in species richness in five of nine broad habitats assessed, and a reduction in Ellenberg fertility in six habitats.

Between 61 and 100% of IoS were met at resurvey for the majority (57%) of parcels, in line with previous studies, and varying with the HLS option and habitat. A lower proportion of IoS were met for species rich grasslands and the wild bird seed mix arable option. The proportion of IoS met also varied with type; for example, fewer relating to positive indicator species were met than those for negative indicator species. Where the baseline panel appraisals had judged options to be well allocated, IoS were more likely to have been met. Both the baseline and other studies (Boatman et al., 2014; Jones et al., 2015) have identified IoS as a frequently deficient element in building HLS agreements, as they were often not tailored to site conditions, set at too higher a level, too technical to be of value to agreement holders, and in some cases not measurable. Less than a quarter of agreement holders referred to IoS regularly.

Agreement holder interviews led to a number of important findings and themes. 65% of agreement holders had previously implemented an AES scheme, but often this was ‘entry level’, so the transition to HLS was a step up in agri-environmental management. There was considerable variation in previous experience of AES and informal environmental management among agreement holders, leading to different understandings of the requirements of agreements and varying support needs. A ‘one size fits all’ implementation strategy for AES will thus have limitations.

Relationships with NE delivery staff were key to agreement holders’ experience of HLS. Agreement holders valued having control of agreement design, NE staff flexibility and long term relationships with NE staff. High turnover of NE staff and lack of contact were

identified as problems. Agreement holders were more likely to perceive that their agreements were a success if they felt they had complete or considerable control over the design of their agreement.

Financial factors were the strongest motivation for agreements holders who had been more ambivalent towards HLS. Other motivations among agreement holders included a practical fulfilment/fit with existing systems, the desire to continue environmental work and a wish to benefit the environment and other people.

The majority of agreement holders (60%) felt management prescriptions were suitable for their land, though a substantial minority thought they could be improved. Although IoS are the main basis by which agreements are judged, few (22.6%) agreement holders reported referring to them regularly. Confidence in achieving IoS, and perceptions of the ease of this achievement, also varied with the type of option.

In addition to their relationships with NE staff, other concerns raised by agreement holders included the administrative burden and difficulties with the RPA undertaking compliance monitoring. Suggestions for improvements included more regular interactions with NE, ability to talk to advisors directly via the phone, and a reduction in the complexity of agreement administrative processes.

Nearly half the agreement holders interviewed said they would definitely enter an AES after their HLS agreement finished, and a majority said they would not continue such work in the absence of a formal scheme. A greater proportion of agreement holders who considered their agreement to be an environmental success wanted to carry on with a similar scheme in the future, compared with fewer of those who were less certain about the success of their agreement.

Relationships were found between some environmental variables and agreement holder characteristics, but these varied with habitat / HLS option (grassland and moorland vs. arable options). Analyses at the scale of options also showed agreement holders were overconfident about achieving IoS.

Recommendations

Targeting of management options needs to be improved, in particular to avoid the quality of semi-natural grasslands being exaggerated at the start of agreements.

There is a need to develop IoS that set rigorous targets appropriate to specific sites, while also being readily measured and understood by agreement holders.

A lower high turnover of NE advisors would help to build more long term, positive relationships with agreement holders.

Ensuring agreement holders feel they have some degree of control over their agreements will lead to more confidence about a successful outcome of HLS agreements.

Improved training for those agreement holders with less experience of higher tier AES may also improve the implementation of HLS agreements.

Links between agreement holder characteristics and environmental outcomes need to be investigated further at the level of specific options / habitats.

Future monitoring of AES should include a tailored counterfactual, in the absence of monitoring of the wider countryside, such as Countryside Survey which provided a counterfactual for previous AES monitoring.

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