Table 5.1: review of indicators used to detect and interpret change in English AE schemes

Endnote number	Title	Authors	Scheme monitored	Target Habitats	Monitoring objective	Indicators
85	Ecological evaluation of the Arable Stewardship pilot scheme, 1998-2000	ADAS, CLUWRR, Newcastle University; EGI, Oxford University; GCT.	Arable stewardship	Arable land	Ecological evaluation of effects of Options (land management options in agreement pilot scheme) to assess contribution to creation of valuable wildlife habitats, actual and potential benefits to rare species associated with arable land	Species presence and absence, species groups, species richness, bare ground, litter, species composition. veg. height; cover of monocots, dicots, crop species, litter, bare ground; no. of monocots, dicots, annuals, perennials; species habitat association classes. **Rare species**: no. of individuals per site. GIS model predicted species abundances.
86	Monitoring and evaluation of the countryside stewardship scheme. Module 2. The ecological characterisation of land under agreement	P.D. Carey, C.L. Barnett, P.D. Greenslade, L.G. Firbank, R.A. Garbutt, E.A.Warman, D. Myhill, R. J. Scott, S. M. Smart, S.J. Manchester, J. Robinson,	Countryside stewardship	BAP and Priority, Nationwide survey	Ecological assessment of agri-environment scheme	Indicators of diversity - number of species per quadrat, NVC, CVS, frequency distribution of indicator species
132	Woodland scheme - bird data, analytical methods and results	Cranfield University	Farm Woodland scheme, Farm Woodland Premium scheme	Woodlands	to determine the environmental benefits (specifically biodiversity) of new farm woodlands under the Farm woodland scheme and farm woodland premium scheme	NVC, relative species richness, relative species diversity (Simpsons index), DCA,
80	Monitoring of the Former Setaside Land option of the Habitat Scheme 1994-1997	ADAS	Habitat scheme	Set-aside land	To monitor wildlife habitats on or adjoining land formerly under the 5 year set aside scheme. Improving habitats for birds and botanical condition	Twinspan, autecology of species 'considered',
79	Botanical monitoring of the Saltmarsh option of the Habitat Scheme 1995-1997	ADAS, CEH	Habitat scheme	Saltmarsh	To assess effectiveness of creation and expansion of areas of saltmarsh	No baseline surveys. Habitat mapping to NVC. Boundaries digitised using Erdas IMAGINE software. Proportion of species characteristic of saltmarshes in quadrats as main response variable as well as frequency of pin hits on bare ground.
140	Plant survival and sea water inundation at Abbots Hall managed retreat during the year 2000	ADAS	Habitat scheme	Salt-marsh-managed retreat to develop salt marsh vegetation	To determine the tolerance of saltmarsh species to prolonged inundation, the minimum number of inundations needed to give saltmarsh plants a competitive advantage	Species richness, Ellenberg salinity index.
81	Monitoring of the Water Fringe Areas option of the Habitat Scheme 1994-1997	ADAS	Habitat scheme	Water fringe areas	To assess whether the wildlife conservation value of banksides and agricultural land bordering water course has been maintained and enhanced. (N.B. this includes assessing habitat for water voles as well as vegetation)	Landuse GIS map. Twinspan, NVC, Suited species scores, G, Nu, W, T , vegetation height variance, Water voles- low G scores to reflect rank grassland, high P scores severe poaching, species data analysed according to potential canopy height (Hodgson),

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Endnote number	Analysis	(level of) Data requirement for external data	(level of) data requirement from monitoring method	Sensitivity to detecting change	Expertise required for interpretation
85	Botanical assessments were done at the individual site scale, and on agreement farms only (37 in E. Anglia and 38 in W. Midlands). The GIS model was done at the whole Pilot Area scale, in East Anglia P.A. only. The GLM used Pilot Area, farm, management option and year to analyse data. CANOCO was used to determine dfferences between communities. Ecological modelling using GIS, CEH landcover map, PCA of habitat proportions of each farm, predicted, maps of species distribution created and values substituted into the linear models. Results from statistical analysis reviewed within framework of species predictions, used with modelling to assess overall impact of scheme.	Medium, information on species distributions taken from literature to put into models, CEH landcover map.	Medium	High, detailed field data used together with modelling and additional information to try to analyse landscape level changes.	Medium
86		Low, classified using SIMIL, ordination	Low- Plot data, methodology for CS2000	Medium	Quite straightforward to interpret, care may need to be taken in interpreting the differences between definitions of Broad and priority habitats and CVS
132	data for ground vegetation and bird populations subjected to DCA to determine degree of similarity of FWS/FWPS woodlands.	Low	Low	Medium- random quadrats of site,	Low
80	SETSARIO to predict succession. Dominance compared to set aside scheme monitoring (critchley et al)	Low	Medium	Low-medium	Medium
79	Data analysed using repeated measures ANOVA. Methods the same for both ADAS sites, analysis not mentioned for ITE sites.	Low	Medium	High	High
140		Low	Medium	High, survey related to inundation, using Ellenberg scores good for detecting change	Low- no complex analysis
81	Tests for difference between WFA's and management options, unbalanced data so had to have separate models, repeated measures ANOVA for each variable, to predict magnitude of change, similar sites identified from ESA program.	Medium	Medium	High	Medium

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Endnote number	Complexity of analysis and level of expertise required for data manipulation	Statistical Issues	Suitability for monitoring objective	Provides useful management information	Applicable to wide range of habitats	Usage across AE schemes	Strengths	Weaknesses
85	High		Botanical assessments compared different agreement options; GIS compared agreement and non-agreement land. By comparing agreement and non-agreement land can attempt to assess the effect of management on habitats and species at a landscape level allowing some insights/predictions.	Yes, analysis incorporates the management practices associated with different options.	Yes	Yes, it uses relatively simple field data, the complexity comes from applying additional information and creating models/GIS. Other schemes have been set up to compare agreement and non-agreement land in a similar way.	1. Patterns of species distribution are examined at a larger scale than just one specific field site. It should enable more general predictions and conclusions to be drawn. 2. Attempts to evaluate the success of AE schemes, goals were precisely defined. 3. Produces a lot of information on different species groups. Field data has been matched to analysis to attempt to answer specific questions.	1. There is no baseline data with which to compare the results of this monitoring. This is a one-off survey which is evaluating AE scheme by comparing field observations to modelled species distributions i. observed vs expected and agreement farms with non-agreement farms. Results will be affected by differences in the types of farms/farmers who go into agreement. 2. The farms had only been in agreement for one year.
86	Medium- ordination and SIMIL	Data of Broad and Priority Habitats presented as proportions without confidence limits.	Good because it was looking at a National scale and comparing Agri-environment schemes to control data from the wider countryside. As mentioned in the report there is more that could be done with the data collected and it would be possible to look at other indicators.	Management codes used in association with Broad and Priority Habitats give some idea of how management associates with habitat. Management codes can apply to a larger area than Habitat so then lose usefulness. It should be borne in mind that this is a National estimate and does not look at the specific effects of a Management practice, so in that context it does provide management information.	Method used over a large range of habitats	Yes	1. Sets sites within the context of the wider countryside.	1. Differences between Broad and Priority Habitat classification and the CVS.
132	Low	Small sample size for vegetation data (12 sites) to extrapolate to scheme	Not very suitable for plants, better data for birds.	Some	Yes	Yes	1. Some information collected on botanical diversity of woodlands in the farm woodland scheme.	1. Gives diversity data for a small number of sites which is then supposed to extend to determining whether the scheme has had environmental benefits. 2. Short time scale for woodlands. 3. No precise targeting of objectives and matching botanical data to them. 4. No matching of scheme and non-scheme sites. 5. Year of entry to scheme known but not year of planting.
80	Medium-high	Total sample 40, but 10 of these chosen to 'top up' original random sample. i.e. not all random. One field chosen per agreement chosen in order to get as much variety and interest as possible?	Good	Possibly	Yes	Yes	1. Collected data.	1. Method attempts to compare to the results of a previous survey although these fields are older rather than attempting to define a target community and measure how the scheme had fulfilled an objective. 2. Non random sampling, not all agreements chosen randomly and then fields chosen according to biological interest. 3. Set aside difficult habitat to assess, different reasons for its establishment purpose and causal.
79	Low-medium		Good	Yes	Yes, but most applicable to current scheme	No	1. Simple, combination of vegetation mapping and statistical tests based on proportion of halophytic species gives a good indication of whether the objectives are being met. 2. There was also more detailed research being carried out at some of the sites.	1. Report only covers a couple of years, needs longer term for definite conclusions from this sort of work.
140	Low		Good- relates topographic information to species cover, target communities identified by using Ellenberg salinity scores to represent halophytic communities	Yes- site level and for similar schemes	Yes, but topographic element specialised	Yes	1. Simple. 2. Relates species information to physical measurements. 3. No complex analysis but there aren't many species so not really necessary to assess success of salt marsh creation.	
81	Medium		Good - botanical monitoring similar to other ESA's- suited species scores BUT other objective to assess quality of habitat for water voles uses botanical analysis + extra (based on potential canopy height) to make predictions about suitability for water voles.	Yes	Yes	Yes	1. See other critiques of suited species scores for botanical monitoring. 2. Attempting to assess suitability of habitat for voles based on botanical composition enables some predictions to be made based on available evidence without requiring resources for additional survey.	1. Assessment of vegetation structure for water voles using suited species scores and potential canopy height. Suited species scores tell you the proportion of species suited to grazing and you can also look at the potential canopy height but this doesn't tell you what state the vegetation is actually in, on river banks management will be particularly important. 2. Only gives an indication of suitability, requires more information.

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Endnote number	Title	Authors	Scheme monitored	Target Habitats	Monitoring objective	Indicators
84	MAFF Moorland Scheme Biological Monitoring Programme Report for 1997/98	ADAS	Moorland scheme	Moorland	To estimate grazing by biomass utilisation (BU) for discontinuous vs continuous, to discover whether utilisation results in suppression, detect changes in veg composition at interface with grass, detect ecological improvement and the relationship between changes in botanical composition and BU.	Vegetation maps, Heather BU, Grazing assessment (Poulton) calibration of GI with BU, Suited species, G, Nu, A, W, Veg height and GI, G score and preagreement stocking rate. Monitoring 1995 and 1996, still establishing baseline.
30	Botanical Monitoring of Grassland in the Broads ESA 1987–1994	ADAS	ESA	Grassland	To monitor whether botanical quality of grassland has been maintained and enhanced under ESA management. To assess changes in species composition and abundance.	NVC, Suited species- G, Nu, W, P. Species presence and DOMIN,
31	Botanical Monitoring of Dykes in the Broads ESA 1987-1994	ADAS	ESA	Dykes	To determine whether overall value of dykes being maintained or enhanced, to detect long term changes.	Classification into communities defined by trophic status, changes in abundance of selected species
215 (was 32)	Botanical Monitoring of Grassland in the Pennine Dales ESA 1987–1995	ADAS	ESA	Grassland	To determine botanical value of grassland being maintained or enhanced, to detect any significant changes in vegetation, describe grassland resource under ESA management. To determine cutting dates on ESA agreement land, to determine impacts of ESA prescriptions on cutting dates.	NVC, N, Gu, P indicators analysed by presence and weighting (DOMIN), Single species change analysis (selected indicator species).
27	Botanical Monitoring of Grassland in the Somerset Levels and Moors ESA 1988–1995	ADAS	ESA	Grassland, wet grassland	To determine botanical value in grassland and grassland in raised water level areas, is being maintained and enhanced, to assess changes in species composition and abundance,	**Permanent grassland**-NVC, suited species scores- W, Nu, G, P,**Raised water level grassland**- suited species scores -W, Nu, G, P, presence of grass, sedge, rushes characterised by tussock growth forms. optimum scale**Ditches**- Species richness Shannon-Weiner function diversity index
28	Botanical Monitoring of Grassland in the South Downs ESA 1987-1995	ADAS	ESA	Chalk grassland, river valley grassland and grassland on former arable land.	To assess whether botanical quality of chalk and river valley grassland has been enhanced, maintained and increased. Performance indicator - increases in vegetation characteristic of chalk grassland, vegetation with potential to develop into chalk grassland established on former arable land.	1. **Arable reversion to chalk grassland**- strata Tier, grassland type, soil type. Suited species scores- G, Nu, C (calcareous), W. Cover of species sown & unsown. Cover of groupings of species (eg chalk grassland species) split into 7 NVC groups. **Experiment to assess botanical and agronomic value of restored arable land** Stand scores, herbage analysis. **2. Permanent Grassland**- Domin values, Suited species scores (G, Nu, C, W), Changes in abundance & frequency of individual species.
29	Botanical monitoring of heathland and semi-natural grassland in the West Penwith ESA 1987-1995. ADAS report to MAFF	ADAS	ESA	Heathland, Semi-natural grassland	To determine whether overall botanical value of rough land is being maintained within the ESA. To detect vegetation changes in heathland structure and species composition in response to cattle grazing and to determine successional changes in structure and species composition which occur over the heathland growth cycle.	**Rough land surveillance;** NVC by Twinspan, Suited species scores- A, G, Nu (G and Nu score difference between extremes), optimum scale. Suited species scores derived for each nest, stand score derived as mean of nest scores, magnitude and consistency. Species diversity and vegetation height. Changes in abundance of 12 selected species. **Heathland grazing**: 1st and last years data only Domin scores, changes in height, changes in cover of 4 dwarf shrub species**post-burn regrowth**: species and height.
34	Biological Monitoring of Lowland Heathland in the Breckland ESA1988–1996	ADAS	ESA	Lowland heath	To determine whether botanical value is being maintained, vegetation changes due to stock and changes in growth phases of heather. To compare heather changes to grazed and ungrazed. To evaluate effects of ESA on reversion from arable to heath and the extent to which it resembles heathland.	**Heathland-** Heather shoot frequency scores, growth phases of heather, changes in heather abundance and height, suited species scores-G scores, species richness. Heather distribution, Domin values. bare ground, litter, dung, sand sedge abundance.**Arable reversion-**suited species (G, Nu and M)

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Endnote number	Analysis	(level of) Data requirement for external data	(level of) data requirement from monitoring method	Sensitivity to detecting change	Expertise required for interpretation
84	ANOVA. Regression analysis between GI and stocking rate, modal plot heather density and GI< G score and GI,	Medium	Medium-High	High	Medium
30	Twinspan, GLM, ANOVA and randomisation, Because strata matched endgroups well analysis carried out on quadrats rather than strata.	Low	Medium	High	Medium
31	GLM, Twinspan to produce endgroups reflecting trophic status. Data then divided into strata.	Low- data for community classification	Low-medium	Medium- quadrat data classified into communities reflecting trophic status.	Low
215 (was 32)	Indicative-7 strata defined (e.g. calcareous grassland, acidic grassland, moorland, neutral grassland divided into several grades). All data combined, weighted-mean DAFOR values, significance tested using GLM and ANOVA + randomisation tests. Validation study-sites were selected according to NVC strata (10 sites per stratum).Extension-ESA management tier. ANALYSIS- Twinspan and NVC, stratification adapted according to how well Twinspan of first survey data matched original stratifications, resultant endgroups used for all 3 survey types. Establish criterion e.g. low soil nutrient levels, N, Gu, P indicators, analysed by presence and weighting (DOMIN), Single species change analysis (selected indicator species) compared to other changes e.g. Nu scores.	Low	Medium	High- because data grouped for analysis detection of change is over a broader spatial scale	Medium
27	**Permanent grassland**-Twinspan, MATCH, suited species scores- presence, DOMIN, statistical significance between scores, GLM and ANOVA, data grouped, main analysis by endgroup, sub-sampls analysed by agreement tier (ignoring grassland type, soil type and endgroup). **Raised water level grassland**- suited species scores- ANOVA models with year, site, year crossed with site, stand nested within site, magnitude and consistency, vegetation height, mean nest species richness, stand species richness, t tests between years. **Ditches**- Means	Low	Medium	High	Medium
28	Quadrats grouped into endgroups using Twinspan and NVC based on first year survey baseline data. **Grasslands** - Suited species scores - presence and weighted. TWINSPAN, MATCH (baseline data), GLM, ANOVA with randomisation test. **Experiment to assess botanical and agronomic value of restored arable land**- ANOVA , Mann whitney and t tests used in analysis.	Low - only for suited species scores	Medium	High	N.B. suited species scores require careful interpretation e.g. C score being used here for calciferous grassland where in arable reversion a decline in C score is not bad as it is due to loss of calicolous arable weeds.
29	**Rough land surveillance**: Twinspan, stands sample to estimate overall change in ESA. Suited species- ANOVA models structure- 'year' 'stratum', year crossed with stratum and 'stand' nested within stratum. Paired sample t tests used to determine significant differences in veg height and species richness. Wilcoxon paired sample tests applied to optimum frequencies for changes in abundance of 12 selected species. **Heathland grazing**: Multi way ANOVA, Agreement status (stocked/unstocked), Site, Agreement x site, plo. **post-burn regrowth:** species and height plot means regressed against interval since last burn.	Low- suited species scores,	Medium-high, different strategies for different objectives, monitoring of rough land, establishing experiment plots and post burn regrowth.	High- each method targeted towards objective, suited species to look at grazing, nutrients etc. height and cover of dwarf shrub species for condition of heath and species and height for regrowth from burning.	Medium-high
34	**Heathland**- ANOVA with four factors, site, management, year and quadrat, randomisation tests, aerial photos for heather distribution. Differences in suited species scores between different fields- ANOVA, differences between vegetation heights and numbers of patches of bare ground - ANOVA. Fields ranked for potential to develop vegetation characteristics of heathland.	Low	Medium	High targeted objectives match methods and analysis	Medium

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Endnote number	Complexity of analysis and level of expertise required for data manipulation	Statistical Issues	Suitability for monitoring objective	Provides useful management information	Applicable to wide range of habitats	Usage across AE schemes	Strengths	Weaknesses
84	Medium	Few grazing units from which to select samples, stratified according to year of entry to scheme, sample selected in non-random manner.	Good, suited species scores and BU (GI) scores used to look at changes	Yes	Yes	Yes	1. Enables reporting on a number of scales, scheme, grazing unit, plot, stand, quadrat. 2. Assesses management-grazing at sites + composition	1. In the first instance looking at changes between differences in yea of entry to scheme after only one year, not long enough time period to notice. 2. Problems with restriction of choice of sites leading to small sample size and non-random selection.
30	Medium	Sites not selected randomly, selection based on fulfilling strata requirements. Because of method of site selection semi-improved grassland over-represented.	Good-suited species scores for particular conditions e.g. nutrients, moisture fulfil objectives well.	Yes	Yes	Yes	1. Suited species scores well suited to sensitive detection of change.	1. Non random site selection makes it difficult to extrapolate to ESA.
31	Low-medium, assignment to community then GLM to identify sources of variation.	Dykes not selected randomly- no dykes monitored on non agreement land.	Yes, classification based on trophic status	Yes, demonstrates how management is effecting nutrient loading.	Method is applicable	Not used widely	1. Quadrat data classified into communities reflecting trophic status 2. Simple	1. Non-random samples.
215 (was 32)	Medium-high	Sites are not a random selection of sites in the area, can't quantify degree of bias, monitoring sites best regarded as a series of case studies.	Good, main ecological variation due to management intensity. Suited species scores related to different aspects of field management.	Yes- combines with management information to assess whether practices are working.	Yes	Yes	1. Suited species scores well suited to sensitive detection of change. 2. Using NVC classified groups which have been validated by field data does enable conclusions to be drawn across the whole ESA at the habitat level.	1. Quadrat based approach might miss spatial variation, e.g. when attempting to detect whether poaching is taking place. 2. Non-random selection of sites makes it difficult to apply results to wider environment.
27	Medium	Non random samples	Good- analysis closely tied to objectives.	Yes, stand, community and ESA	Yes	Yes	1. Suited species scores well suited to sensitive detection of change.	1. Non random site selection makes it difficult to extrapolate to ESA
28	Medium		Good. Detailed criteria based on knowledge of target communities and measured by suited species to a number of important factors such as calcareous spp., grazing etc.	Yes- can look at the assemblage of species and measures such as grazing score to assess what level of management is being applied and what could be changed. Good understanding of relationship between management and quality on calcareous grasslands.	Yes	Yes	1. Dual approach, looking at arable reversion by standard monitoring approach and also by experimental approach to look in more detail at processes. Identified proximity to seed sources as an important reason for failure of reversion 2. Uses a number of factors to explain and identify changes careful determination of pre monitoring targets and measures focused towards achievement of specific goals. 3 Suited species scores well suited to sensitive detection of change.	1. Problems again with sample sizes due in part to to matching agreement with non-agreement sites and the stratification of samples according to community as well as changes in group due to re-classification.
29	Medium-high	Selection randomly stratified. Small number of sites- case studies. Stands permanently marked and revisited, any changes in suited species scores 'real' thus no statistical testing required at stand level. Also used as a sample to allow estimates of overall change within the ESA.	Good - combination of suited species scores and vegetation monitoring with establishment of plots on stocked and unstocked land leads to detailed information on ecological changes.	Yes-points out what is not desirable in terms of management for a site e.g. lack of grazing detected at the ESA level contributes to variation and heterogeneity.	Yes	Yes- suited species scores can be compared to other habitats/ESA	1. Suited species scores well suited to sensitive detection of change. 2. More specific analyses based on Heather grazing and regeneration, more detailed analyses multiway ANOVA to assess contribution of different factors- more experimental approach enables ANOVA parametric test, regression assesses relationship between length of time since burn and vegetation condition.	1. Non random site selection makes it difficult to extrapolate to ESA
34	Medium	Sites not selected randomly-case studies	Good	Yes, site and ESA	Yes	Yes	1. Variety of methods. 2. Targeted towards providing condition measures	

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Endnote number	Title	Authors	Scheme monitored	Target Habitats	Monitoring objective	Indicators
33	Biological Monitoring of Arable Field Margins in the Breckland ESA 1989-1996	ADAS	ESA	Arable field margins	To increase the wildlife conservation value of arable field margins by management as uncropped wildlife strips and conservation headlands and to compare to normally cropped arable field margins. To determine whether differences or changes in vegetation quality could be attributed to differences in management.	**Uncropped wildlife strips** Suited species scores, vegetation contains species suite to regular physical disturbance (D), high summer soil moisture deficit (M), moderate or low nutrient availability (N). Species richness-number of species per transect, Biomass dry weight data converted to g/m^{2}. **Conservation Headlands** Analysis by suited species scores, species richness, plant density, grass tiller counts.
35	Botanical Monitoring of Grassland in the Clun ESA 1993–1996	ADAS	ESA	Grassland	To ensure that vegetation characteristic of unimproved grassland and rough grazing does not deteriorate on land under Tier 1B agreement, Vegetation characteristic of unimproved grass and rough grazing increases on improved grass under tier 2 agreement.	Suited species scores, A, G, Nu, P optimum scale stand scores, stands permanently marked and revisited.
36	Biological Monitoring of Moorland in the North Peak ESA 1988–1996	ADAS	ESA	Moorland	To assess whether there has been regeneration of heather, reduced grazing pressure so that heather does not decline due t suppression, increase in area and number of heather burns, whether bracken spraying results in increased dwarf shrub heath.	Sheep distribution, heather grazing - biomass utilisation (annual variation, relationship between BU and stocking densities, spatial patterns, relate to environmental factors) and suppression and burning, heather regeneration.
37	Botanical Monitoring of Grassland in the Suffolk River Valleys ESA 1988–1996	ADAS	ESA	Dry grassland and abandoned wet pasture	To determine whether botanical value of dry and wet grassland is being maintained or enhanced under ESA. To assess changes in species composition and abundance, especially any decrease or increase in characteristic vegetation.	Twinspan, NVC, Suited species scores, scores of G, Nu, W and P. Scores calculate at two different scales-presence of species and Domin values.
38	Botanical Monitoring of Grassland in the Test Valley ESA 1988–1995	ADAS	ESA	Grassland	Botanical value of grasslands maintained and enhanced, assess changes in species composition and abundance.	Suited species- W, Nu, G, P.
39	Environmental Monitoring in the Avon Valley ESA 1993–1996	ADAS	ESA	Grassland	To assess whether grassland been retained, increased in area and whether wet grassland conservation value has been enhanced by maintaining higher water levels.	Landcover map, NVC, linear features resampled.
40	Environmental Monitoring in the Exmoor ESA 1993-1996	ADAS	ESA	Moorland, enclosed grassland	To determine whether botanical value of grass moorland is being maintained, to detect changes in vegetation composition particularly dwarf shrub and mire species, and vegetation structure.	Landcover map, NVC, BU, heather suppression, suited species scores, G, A, Nu, W optimum scale, species richness Between-nest frequencies of species, abundance of key species at optimal scale, vegetation height.

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Endnote number	Analysis	(level of) Data requirement for external data	(level of) data requirement from monitoring method	Sensitivity to detecting change	Expertise required for interpretation
33	**Uncropped wildlife strips** Changes in suited species scores between years analysed using ANOVA, un-replicated mixed model specified using nested and crossed factors. GL used in place of ANOVA for study area 3 as there was missing data. To determine standards of quality an opinion poll of experts was carried out. Using these assessments the success of a site in meeting ESA objectives was estimated using regression techniques. Scores for three criteria combined using a multi-criteria method (Analytical hierarchy process). Species richness, biomass dry weight. ANOVA carried out using same model as suited species scores. **Extensive monitoring** 1989 intensive monitoring data used as the independent variable in a simple linear regression. **Conservation Headlands** Analysis by suited species scores, species richness, plant density, grass tiller counts, GLM's used because of unbalanced replication within a site between conservation headlands and normally sprayed. Randomisation tests. Up to 5000 cycles of randomisation and F values compared to those derived from original data. Relationships between environmental variables and plant species composition (and invertebrate species groups) done us	High (compared to other methods looked at so far)- professional expertise on quality of strips because they are a relatively new phenomena, criterion and information to be added to suited species scores- presumably can then be used again.	Medium- transects with soil and inverts at different intervals.	High, for uncropped margins intensive monitoring carried out every year and extensive once, for Conservation headlands methods good but unfortunately monitoring only took place once. The suited species scores are tailored towards fulfilling prescriptions for the site so measure well the success of the method.	Medium
35	No statistical testing at stand level. Stands also used as a sample for ESA, ANOVA for NU scores, Randomisation test used for other scores. Magnitude and consistency of scores represented	Low	Medium	High	Medium
36	GLM used to analyse effects of survey factors on BU (grazing unit, agreement status, heather dominance and year). Arcsine data transformations used to improve data distribution. Analysis of stocking densities using linear regression - response variable mean BU, 6 independent variables, relationship between BU and 10 environmental variables using stepwise regression. High collinearity in independent variables-randomisation procedure adopted. Spatial patterns in BU analysed using Mantel test. Heather regeneration-single replication ANOVA on quadrat frequency and point cover.	Low	Medium-high	High	Medium-high
37	GLM, ANOVA, randomisation tests used to test differences between scores. Analysis carried out on whole 45 quadrats of data and on classifications based on Twinspan endgroups. Dry acid grassland: analysis done on a) all data and b) by endgroups (veg. type). Abandoned wet pasture – analysis done by location (2 locations).	Low	Medium-quadrat	High	Medium
38	Twinspan, NVC, Differences between scores- GLM.	Low	Medium	High	Medium
39	No analysis of botanical data other than using MATCH.	Low	Medium	Low-medium- veg quality only baseline data, no resurvey, analysis by twinspan and NVC.	High- some expertise interpretation but not complex analysis
40	Differences in BU investigated using ANOVA on arcsine squareroot transformed data, factors, year, agreement class, grazing unit and transect. Differences in responses among agreement classes assessed by considering year x tier interaction, significance of differences in proportions of suppressed quadrats assessed using Fisher exact tests. Relations of BU with 22 environmental and biotic variables investigated using stepwise regression, 9 TWINSPAN endgroups, predictor and response variables standardised to facilitate interpretation of regression coefficients, high collinearity in the independent variables. Two variables from stocking information, mean stocking rate over preceding 12 months, mean of 5 winter months, mean BU for each grazing unit in each year was then regressed against each of these variables using simple linear regression. Spatial patterns in BU analysed using Mantel tests, significance levels in Mantel tests derived from 999 randomisations. Suited species- no testing at stand level, repeated measures ANOVA, year, NVC Community type, grazing unit, year crossed with community and year crossed with grazing unit, ANOVA for changes in height, changes in abundance of 16 species - W	Low	Medium	High, combination of suited species scores, heather BU and suppression, linear and point features,	Low-medium- fairly complex analysis of BU. Analysis of variance between number of factors - requires some expertise.

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Endnote number	Complexity of analysis and level of expertise required for data manipulation	Statistical Issues	Suitability for monitoring objective	Provides useful management information	Applicable to wide range of habitats	Usage across AE schemes	Strengths	Weaknesses
33	Medium-high	Extensive sampling- small number of samples so wasn't possible to ascertain relationships between the success rate of sites and differences in their management.	Good- designed to answer monitoring objectives, whether species diversity had increased, target vegetation had been achieved and management practices had effected vegetation quality. Done using a combination but mostly the suited species scores which were designed to give information abou the 'suitability' to target vegetation.	Yes	Yes- provided sufficient input of knowledge about species and target community.	Yes	1. Targeted approach - a lot of thought put into what the desired community is, the composition of species traits within community. 2. Good way of summarising over relatively large scale how effective scheme has been in achieving target community.	1. Requires additional input from experts/ literature 2. Sample size not large enough on extensive sampling of conservation headlands to provide statistically significant result.
35	Medium	P poaching score, the number of poaching suited species is small, change in single species could have a large effect.	Good, suited species	Yes	Yes	Yes	1. Monitoring matches objectives. 2. Return to same stands so statistically comparable.	1. Reliability of P scores if only a few species, can one species make a large difference?
36	Medium	Mantel tests sensitive to overall shape of grazing unit- interpret with caution.	Good	Yes	Yes	Yes	1. Comprehensive analysis and survey of condition of moorland, uses BU, suppression, heather regeneration, and burning	1. Timescale for monitoring dwarf shrub too short. 2. Monitoring doesn't evaluate extent of heather
37	Medium-high	Sites not statistically representative of ESA because not selected randomly. Not possible to quantify degree of bias. Small data sets, not possible to draw general conclusions about causes of change for all classified end groups.	Very good- suited species scores used t determine the success of a particular objective, can be quite precise in determining what the target community is and how close the resultant has been to that.	Yes	Yes	Yes	1. Analysis methods match objectives very closely. Specifi information on suited species to particular conditions e.g. Nu score for nutrient level in grasslands. 2. Works well classifying data into endgroups and then looking at the condition of these it makes it easier to extrapolate between habitat types and if sampling had been widespread enough, then could have been easily extended to ESA.	1.The methods used to select the monitoring sites did not allow the results to be extrapolated to the whole ESA and each vegetation site sampled should be considered as a separate case study. 2. Difficult t compare to 5 year review because different analysis method used.
38	Medium		Good	Yes	Yes	Yes	1. Suited species scores well suited to sensitive detection of change	
39	Low	Random sites	Medium- landcover map gives information on area of grassland, quality determined by looking at distribution of NVC communities. Can't tell effects of ESA prescriptions and no re-survey or more targeted methods.	Yes- Community/ESA and site	Yes	Yes	1. Simple. 2. Gives information on communities present in ESA - can characterise them to some extent. Linear and point features assessed.	1. No re-survey of grasslands so couldn't detect change or carry out change analysis.
40	High	May be sampling error in testing for spatial distribution, not adequately sampling the range of variation. Heather condition grazing units not selected randomly.	Good, range of factors being measured, fairly complex analysis partitioning for variation, gives information on heather condition for different agreement classes and year, suited species scores for grass, moorland condition.	Yes, Stand, Community, ESA	Yes	Yes	1. Suited species scores well suited to sensitive detection of change. 2. Specific analyses based on heather grazing and regeneration, detailed analyses multiway ANOVA to asses contribution of different factors, experimental approach enables ANOVA parametric test.	1. Non random site selection makes it difficult to extrapolate to ESA 2. Difficulties in selecting agreement and non-agreement sites. 3. No re-survey of permanent grassland

Table 5.1: review of indicators used to detect and interpret change in English AE schemes

Endnote number	Title	Authors	Scheme monitored	Target Habitats	Monitoring objective	Indicators
41	Environmental Monitoring in the North Kent Marshes ESA1993–1996	ADAS	ESA	Grassland, ditches	To obtain baseline data for grassland vegetation. To determine whether the botanical value of the ditches is being affected.	Between-nest frequencies of species. Ditch vegetation assigned to EN/NRA endgroups. Frequency/dominance score.
42	Environmental Monitoring in the Lake District ESA 1993–1996	ADAS	ESA	Heather moorland, wetland	To assess whether wildlife conservation value and landscape quality of heather, montane heath and other areas of semi-natural grassland is being enhanced and maintained. To determine whether species composition of wetlands was changing, to measure magnitude and direction of change.	**Heather condition**-Biomass utilisation and suppression. Average winter stocking densities. Numbers & area of burn, type of burn (managed small, accidental, inappropriate large) **Wetland vegetation-** Between-nest frequencies of species, optimum scale, suited species scores (Nu, G, W and P). Stand score mean of 32 nests. NVC.
43	Environmental Monitoring in the South West Peak ESA 1993–1996	ADAS	ESA	rough grazing-unimproved acid grassland, semi-improved acid grassland, dry modified bog. permanent grassland	To describe the composition of vegetation entering tiers of the scheme, to detect changes in botanical composition that are significant in relation to environmental objectives. To assess whether wildlife conservation value of semi-natural upland vegetation and grassland has been maintained and enhanced	**Grassland**-NVC, suited species scores, A, Nu, G, W, P, optimum scale, veg height, mean species richness,**Heather grazing**-Biomass utilisation, suppression, Heather burning-maps, linear and point features
44	Environmental Monitoring in the South Wessex Downs ESA 1993-1996	ADAS	ESA	Downland, semi-natural grassland	Vegetation characteristic of downland and semi-natural grassland does not deteriorate.	**Grassland**- NVC, suited species scores, G, Nu, C, vegetation height, species richness, abundance of particular species. Butterflies-veg structure, veg height, changes in abundance of butterfly food plants.
45	Environmental Monitoring in The Blackdown Hills ESA 1994–1997	ADAS	ESA	unimproved grassland, mires and heaths,	1. Short survey period, change in botanical value not monitored. Baseline survey of semi-natural grassland, mires and heath	Between-nest frequencies of species, NVC
46	Environmental Monitoring in The Cotswold Hills ESA 1994–1997	ADAS	ESA	Grassland, linear features including trees	Baseline survey only carried out. To assess changes over time in high quality grasslands and grasslands which have been allowed to revert from improved.	NVC, Between-nest frequencies of species.
47	Environmental Monitoring in the Dartmoor ESA1994–1997	ADAS	ESA	1. Moorland. 2. Permanent grassland, unimproved pasture, enclosed rough land. 3. Hay meadows.	1. Assess whether condition of moorland vegetation is being maintained. Assess changes in vegetation structure and composition resulting from management practices. Monitor heather condition to quantify grazing, variation in biomass utilisation related to thresholds of suppression. Overgrazing and loss of dwarf shrub heath. 2. Establish baseline monitoring data for hay meadows.	Between-nest frequencies of species, vegetation described by NVC, mean heather cover, mean dwarf shrub height, Grazing index - Biomass Utilisation (BU), NVC, Suited species score - G criterion
48	Environmental Monitoring in The Shropshire Hills ESA 1994–1997	ADAS	ESA	Moorland, permanent grassland, semi-natural grassland,	To describe grassland communities (i.e. only baseline data) to maintain landscape quality and conservation value of open moorland and permanent grassland, heather and semi-natural vegetation.	BU, suppression, NVC.
49	Environmental Monitoring in The Upper Thames Tributaries ESA 1994–1997	ADAS	ESA	Grassland	This report describes the baseline data of the monitoring program	NVC, linear features.

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Endnote number	Analysis	(level of) Data requirement for external data	(level of) data requirement from monitoring method	Sensitivity to detecting change	Expertise required for interpretation
41	MATCH, Twinspan	Low	Low	Low- no re-survey only baseline data due to resources and decision that it wasn't required. Data not analysed for botanical quality	High- simple measurements and classification. Expertise required to make prescriptions/judgements
42	Quadrats classified by year agreement status and fell (site). Differences in BU amongst these factors ANOVA on arcsine squareroot transformed data. Simple linear regression mean BU regressed against average stocking densities for each fell, change in BU against stocking density. Relationship of BU with 9 environmental and biotic variables investigated using stepwise regression-response variable residuals of BU remaining after ANOVA. Discrepancies in BU between surveys may be due to methodology, observer bias, calibration, ANOVA results compared. Changes in suited species scores comparing stand means (magnitude) and consistency (no. of nests showing increase vs number showing a decrease). Estimate of overall change across stands repeated measures ANOVA.	Low	Medium-high, varied,	High, N.B. community type, wetlands slower to exhibit change.	Medium. Recommends careful interpretation on stand by stand basis for wetland NVC's.
43	MATCH, suited species- repeated measures ANOVA, factors into model, year, NVC, agreement, year x NVC, year x agreement. Tukey tests. Changes in frequency of soft rush at the optimal scale analysed using Wilcoxons signed rank test. paired t tests for mean nest species richness. Primary analysis on Bu using ANOVA, grazing unit, tier and year, BU transformed using an arcsine square root transformation. Analysis of stocking levels using linear regression, Mantel tests to see if spatial clustering of similar levels of BU. Relationship between environmental variables and BU stepwise multiple regression.	Low	Medium	BU/grazing index-High, Suited species scores -High No re-survey for permanent grassland	Medium-high
44	GIS, digital mapping, repeated measures ANOVA, year, NVC community type, agreement, year crossed with NVC type, and year crossed with agreement, to assess quality ANOVA using same model, C, G, Nu, vegetation height, changes in abundance of species of particular interest. For individual species Wilcoxon paired sample tests were applied to their frequencies at optimal scale. Butterfly food plants - sig differences between years examined using the Friedman's test, changes in abundance of food plants, comparison of optimal frequency, Wilcoxon paired-sample tests applied to optimal frequencies.	Low	Medium	High, a number of factors have been used,	Medium
45	MATCH	Low	medium	Not at present, no re-survey data	Medium
46	MATCH	Low	Medium	No changes detected yet just baseline data.	Medium- qualitative data, does require some expertise to make judgements on.
47	Differences in BU analysed by ANOVAS MATCH, TABLEFIT Wilcoxon paired sample tests.	Low	Medium	BU/grazing index- High, Suited species scores - High	Medium
48	BU- stratified random sample based on previous pilot survey, quadrats allocated to grazing units in proportion to the variability of BU recorded within grazing units. ANOVA grazing unit and tier, data arcsine square root transformed, residuals used to measure relationship between BU and environmental variables. Stepwise multiple regression, no analysis on BU and stocking density-difficulties getting data on stock numbers. Differences between grazing units in proportion of suppressed quadrats analysed using chi-squ tests. Only Twinspan on grassland data	Low	Medium	Only baseline data	Medium
49	Digital maps, MATCH, condition change of linear features.	Low	Medium	Not at present, no re-survey data.	Good- straightforward, NVC and linear feature.

Table 5.1: review of indicators used to detect and interpret change in English AE schemes

Endnote number	Complexity of analysis and level of expertise required for data manipulation	Statistical Issues	Suitability for monitoring objective	Provides useful management information	Applicable to wide range of habitats	Usage across AE schemes	Strengths	Weaknesses
41	Low	Sample size of ditches too small	Not good. No resurvey of ditches or grasslands due to resources, small sample sizes and because few changes in grassland management.	Some- classifies habitats and distribution.	Yes	Yes	1. Simple. 2. Quick. 3. Classification of habitats gives mor information on habitats in area than available previously.	1. No quantitative analysis of quality. 2. No re-surveys to look in detail at changes in condition.3. No matching of objectives and analysis.
42	Medium	Separate calibration equations for each year with very different coefficients. Suited species scores of permanently marked and revisited stands, so real change, not sample. Only need statistics when extrapolating to ESA. Case study fell sites not statistically representative	Good, variety of methods to answer a range of objectives. There were problems with the biomass utilisation (BU) method as methodological problems prevented successful use of this indicator.	Yes, stand by stand and ESA	Yes	Yes	1. Varied methods to answer range of objectives 2. Methods match objectives well 3. Comparable to other AE schemes.	1. Methodological problems resulting in unusually low BU levels
43	Medium-high	Stands permanently marked and revisited- no statistical testing at stand level	Yes for rough grassland and moorland Suited species scores, BU, heather burning, Rough grassland re-surveyed, permanent grassland hasn't been. Baseline data only for permanent grassland.	Yes at the stand level, NVC and ESA	Yes	Yes	1. Suited species scores well suited to sensitive detection of change. 2. More specific analyses based on heather grazing and regeneration, more detailed analyses - multiway ANOVA to assess contribution of different factors - more experimental approach enables ANOVA parametric test, regression assesses relationship between length of time since burn.	1. Non random site selection makes it difficult to extrapolate to ESA 2. Only baseline data for permanent grassland. 3. Tried to compare agreement and non-agreement but sites changed agreement status.
44	Medium	Grassland plots permanent, no statistical testing at stand level.	Good, variety of methods to answer a range of objectives, suited species scores, veg height, species richness both as straight vegetation indicators and in association with butterfly distribution.	Yes, at plot level and ESA level.	Yes	Yes	1. Varied methods to answer range of objectives. 2. Methods match objectives well. 3. Comparable to other AE schemes. 4. Veg information used in association with butterfly monitoring to look at habitat suitability.	
45	Low	Sites selected randomly across the county, only 16% on agreement land. Statistical issues – sites selected from 2 counties (Somerset & Devon).	No re-survey information so it isn't possible to address quality objectives at present.	Yes at stand, community and ESA level	Yes	Yes	1. Provides baseline data to compare to future monitoring	1. Only baseline data no re-survey so not possible to look at changes in botanical quality,
46	Low	Preference given to grassland sites of high botanical quality i.e. not random	No resurvey for most features so difficult to assess success of scheme.	Some- information on the types of community there	Yes	Yes	1. Some information on habitats present, quality only possible to assess by comparing to NVC and using NVC type to represent target.	1. No analysis as only baseline survey. 2. Difficult to relate monitoring objective to result. 3. Preference given to sites of high botanical quality, i.e. not random.
47	Medium	Whole moorland approach used to determine BU, makes it difficult to compare to other studies which may have targeted on dwarf shrub heath.	Biomass utilisation used to identify whether heather is suppressed on agreement land, increased grazing of heather in calcifugous grassland. Does not use other vegetation data to look at change, only those related to grazing measures.	Monitoring identifies that damage to dwarf shrub heath is taking place but does not evaluate the impact of factors such as cattle trampling.	Yes	Yes	1. Sensitive to detection in changes in vegetation due to grazing regime .	1. Higher biomass utilisation than other ESA's because whole moorland sampled rather than units of dwarf shrub heath. 2. MLURI suppression thresholds used to assess suppression based on upland grazing not specific to south west.
48	Medium		Without re-survey only possible to get information about the nature of communities already present and the current condition of heather rather than being able to assess effectiveness of scheme	Yes	Yes	Yes	1. Provides baseline data to compare to future monitoring. 2. More specific analyses based on heather grazing and regeneration, more detailed analyses including multiway ANOVA to assess contribution of different factors - more experimental approach enables ANOVA parametric test.	1. Only baseline data, no re-survey so not possible to look at change in botanical quality.
49	Low	Non-random sample selection.	No re-survey information, quality objectives have been addressed by considering wader density and distribution of habitat types.	Yes, at stand, community and ESA level.	Yes	Yes	1. Provides baseline data to compare to future monitoring	1. Only baseline data no re-survey so not possible to look at changes in botanical quality,

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Endnote number	Title	Authors	Scheme monitored	Target Habitats	Monitoring objective	Indicators
92	Botanical evaluation of set-aside in England	ADAS	Habitat scheme	Set aside land	To describe in detail the vegetation occurring on permanent fallow set aside land.	For each species % of sites, % of quadrats species It occurred in and was dominant number of species recorded, number rare or declining species recorded, total numb of species recorded, mean number of species recorded per site, mean number rare and declining sp per site, mean number species unique to group.
335	The effectiveness of ditch management in ESA's	ADAS	ESA	Ditches	To assess the effectiveness of ditch management	number of ditch classes within each study site,
133	Monitoring of grassland in raised water level areas on Tealham and wet moors in the Somerset levels and moors ESA 1993-1998.	ADAS	ESA	Wet grasslands,	To determine whether botanical value of wet grasslands is being maintained or enhanced in RWLA's. To detect any changes in the vegetation which are significant in relation to th relevant environmental objective of the scheme.	Veg height, suited species- W, Nu, G, T, magnitude and consistency.
334	Supplementary environmental assessment and future monitoring proposals for former setaside option land	ADAS	Habitat scheme	Setaside land	To carry out further analyses of the baseline botanical and habitat features data.	Suited species scores- high soil fertility (nutrient), soil disturbance (Disturbance), wetlands (wetland), woodlands (woodland), acid soils, (Acid), calcareous soils (Calicole), ability to form tussocks in wet soils (tussock), species richness, mean ve height, coefficient of within quadrat variation in veg height, coefficient of variation between quadrats, bare ground, frequency of tussocks, litter, GIS: plots studied to assess whether patterns in distribution of variables discerned- species richness, suited species scores, individual species associations, veg height.
259	Agronomic and Environmental evaluation of setaside	ITE, ADAS and BTO		Set-aside	To monitor species composition and predict future species distribution on former set-aside land.	Plant composition, species diversity-taxon richness.
341	Potential re-examination of botanical and hydrological data from the Somerset levels and Moors ESA: review, assessment and proposals	ADAS	ESA	Lowland wet grassland	To identify the degree of correspondence between the sites within the Somerset levels and the Moors ESA used for botanical and hydrological monitoring and to evaluate combining datasets. Proposal only.	Suited species scores against hydrology, trends in both over time.
182	Plant species richness in farm woodlands. Forestry. 65. 1-13	Usher, M.B., Brown, A.C., Bedford, S.E.	Farm woodland scheme	Woodland	To assess the benefits in terms of plant species richness in woodlands planted during the first half of the twentieth century	Species richness only. The number of species found on a walked transect, and the total number of species found (both not including trees and shrubs as most of these will have been planted.)
351	Managed realignment at Tollesbury and Saltram	ITE	Habitat scheme	Saltmarsh	Monitoring the natural processes of siltation to establish the effects of different pre-treatments on the establishment of salt marsh plants.	Mapping of species distribution and species frequency.

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Endnote number	Analysis	(level of) Data requirement for external data	(level of) data requirement from monitoring method	Sensitivity to detecting change	Expertise required for interpretation
92	Chi-square tests to compare ratios of sub-groups, parametric t tests diffs in means between sub-groups, . TWINSPAN, for each community and age of site, ratio of numbers of sites for each establishment method compared using a chi squared test with the expected ratio based on the total number of sites. Decorana on data treating each visit as a separate record. ANOVA to test for significance of sub-group means, for example the numbers of species per site analysed using multiple regression techniques.	Low	Medium- quadrats across field	Medium- lots of diversity measures	Medium
335	Ditches classified into classes grazed/ungrazed, water depth.	Low	Low	Low	Low
133	Stands permanently marked and revisited, any changes in suited species score real, repeated measures ANOVA models with structure, 'year', 'site', 'year crossed with site', Tukey tests. Changes in abundance of species of interest Wilcoxon paired sample tests.	Low	Medium	High- suited species scores	Medium
334	Site mean and standard error values calculated for species richness, mean veg height and within quadrat variation. Degree of association between different ecological features and vegetation characteristics investigated by compiling a correlation matrix based upon site means for the variables above, matrix based upon Pearson product moment coefficients, GIS: quantitative analysis of spatial variation in plant community composition, species richness and veg height, ordination, Geostatistical analysis, distribution of individual species across a site.	High	Medium	High	High
259	Models of species distributions using BSBI data and soils and validated with CS. Multivariate analysis of botanical data. Rotational set aside and non rotational set aside, SETSARIO. Species data analysed with respect to region, soil type, age of setaside, previous cropping and set aside management activities, NVC, linked a set of theoretical models to account for different scales of effects on the plant community. distinguished between plants associated with different kinds of soils, soils within each 1km square used to improve the maps of probability of occurrence. Data from CS used to test the ability of maps to describe the distribution of plant species. species presence/absence records in non-rotational naturally regenerated field sites compared with predictions from the distribution model.	High	Medium	Low	High
341	Gowing *et al.* ecology-hydrology response model, calibration plot, plotting species frequencies against exceedence values, identifying species tolerance values to frequency and duration of waterlogging, analysis of trends in vegetation and trends in hydrology over same period.	n/a	n/a	n/a	n/a
182	Matrix of presence/absence data analysed using TWINSPAN. Relationship between the number of species and woodland size plotted.	Low	Low	Medium	Medium
351	Little analysis.	Low	Low	Medium	Medium

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Endnote number	Complexity of analysis and level of expertise required for data manipulation	Statistical Issues	Suitability for monitoring objective	Provides useful management information	Applicable to wide range of habitats	Usage across AE schemes	Strengths	Weaknesses
92	Medium		Good- Set aside area hard to set out specific targes as other habitats where suited species scores used to determine whether objectives been met. This method looks at different diversity measures, individual species to monitor	Yes	Yes	Yes	1. Simple. 2. Gives information concerning community types and species composition of set aside land	1. Doesn't answer specific objectives for management of set aside land.
335	Low		Medium	Yes	No	Yes		
133	Medium		Good- suited species scores related to degree of wetness, information about conditions within ESA	Yes	Yes	Yes	1. Suited species scores well suited to sensitive detection of change.	
334	Medium		Investigating data further rather than fulfilling monitoring objective	Yes	Yes	Yes	Descriptive statistics derived from baseline botanical and habitat features data, vegetation data derived from the strength of species associations with soil fertility, acid or calcareous soil types, wetlands and soil disturbance, Use of GIS to show variation in species distributions in associatio with environmental variables within a site. Possible to characterise spatial variation for species richness and veg community composition.	
259	High			Yes	Yes	No	SETSARIO describes typical set aside successions, species models valid at the landscape scale. Best way of looking at botanical changes by fieldwork. Reveals that set aside vegetation and development is uniform,	In none of the species tested was there a significant correspondence between the model predictions and species presence. Factors local to the site such as management history have a greater effect on species presence than larger scale geographic factors. Not yet possible to predict the species composition of an individual set aside field on the basis of site management data or geography. Successional model SETSARIO has key weaknesses, no consideration of soils, litter and bare ground, data-hungry model,
341	n/a	n/a		n/a	n/a	n/a	n/a	n/a
182	Medium	Woodlands not selected at random but to encompass a range of woodland sizes. Cites work that states that species richness is not affected by timing if surveys are performed in woodlands between May and September.						
351	Low		Good-detailed mapping and species colonisation studies.	Yes	Yes	Yes	Simple community type, low species number, can carry out this type of study in this habitat.	