THE DEVELOPMENT AND FUTURE OF LANDSCAPE-SCALE, COLLABORATIVE ENVIRONMENTAL MANAGEMENT IN ENGLAND

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Abstract

Modern agri-environment schemes (AES) have developed since their introduction in England in 1979 following criticism of their lack of effectiveness and poor value for money. Revisions to AES have been based on our increased knowledge of environmental production systems, and the relationship between the aims of AES and the motivations of farmers to participate in them. Recently a raft of studies has argued that environmental benefits can be increased if AES contracts switch from farm- and field- to landscape-scale agreements: finding which, in part, motivated the introduction of Mid Tier in Countryside Stewardship in 2016. This paper traces the development of the cross-farm boundary, landscape scale opportunities offered by AES in England. Future expansion of cross-farm collaborative AES and options are then discussed against the background of the UK's decision to leave the European Union, its continuing membership of World Trade Organisation (WTO), and government support for Payment for Ecosystem Services (PES).

***Key words**: agri-environment scheme, collaboration, landscape scale, ecological networks, farmers*

Introduction

Many recently published academic studies have confirmed Gottfried *et al*. (1996) argument that conservation schemes which are designed at an appropriate scale can capture "economies of configuration". By this Gottfried *et al*. meant that conservation schemes need to take account of the spatial distribution and patterns of the sizes, shapes, numbers and kinds of environmental features and components of ecosystems and landscapes. However, the majority of agri-environment scheme (AES) contracts fail to capture these economies because they are agreed at the field- and farm- rather than at the landscape-scale (McKenzie et al., 2013).

Pressure to improve scheme effectiveness, and therefore value for money, has led to the periodic redesign of AES and environmental management options. Some of these changes were designed to capture available economies of configuration (Concepción et al., 2008, Gabriel et al., 2010, Bengtsson. J. et al., 2005). However, the effectiveness of their cross-farm boundary impacts depend *inter alia* on knowing (i) the appropriate scale of such

landscape scale agreements, and (ii) how much farmer-farmer cooperation or collaboration is necessary. It would appear that the answer to the first question depends principally on the lifecycle characteristics of the environmental schemes' targeted species and habitats (Donald and Evans, 2006) and the farm structure. This implies that the appropriate scale will vary by region. Determining the necessary degree of cooperation or collaboration is perhaps more challenging. Besides depending on the lifecycle characteristics of the targeted species, it also depends on: (i) the percentage of eligible farmers who enrol, (ii) the proportion of strategically important landscape scale features managed by these participating farmers, (iii) their level of involvement in the scheme (i.e. the number and type of environmental options they select), and (iv) the degree of coordination/collaboration they are willing to undertake.

This paper reviews the evolution of AES offered to farmers in England from the perspective of their potential to deliver opportunities for cross farm boundary impacts. In doing so it reveals how scheme design and scheme environmental management options can both have impacts on the degree of cross-farm boundary environmental management achieved, in some instances without the participating farmers being aware that they are contributing towards landscape-scale, collective impacts. The paper then considers how the design of AES and environmental management options might develop to increase cross-farm boundary impacts, given the freedom afforded to scheme design by the UK's decision to withdraw from the EU, the constraint imposed by the continuing membership of the World Trade Organisation (WTO), and government support for Payment for Ecosystem Services (PES).

The first section presents details of how the first management agreement schemes, the Exmoor Management Agreement Scheme and the Environmental Sensitive Areas scheme (ESA), addressed the unique challenges presented to AES of securing agreements over commons and moorlands. It elaborates on how the Wildlife Enhancement Scheme (WES) helped tailor ESA schemes to facilitate agreements between Government and a single representative of all the stakeholders with rights over the moorland. This is followed by a description of the Environmental Stewardship Scheme's (ESS) High Level Stewardship (HLS) (2005-2015), again with the focus on commons and moorland, because such agreements required farmers to jointly submit a single application covering their shared land. This same scheme offered the first specific cross-farm boundary environmental management option, HR8 "Supplement to group action". The use and take-up of this option is reviewed. More recently, Countryside Stewardship's Mid Tier was introduced in 2016. The mechanism by which this tier incentivises cooperation and collaboration between neighbouring or near neighbouring farmers is outlined. The progressive development of cross-farm boundary

impacts is then summarised by reference to seven key scheme characteristic. These characteristics are used as the basis for a discussion on the future development of cross-farm boundary schemes and environmental management options within the policy environment created by the UK's decision to leave the European Union, continuing membership of WTO, and government's support for Payment for Ecosystem Services (PES). A brief conclusion completes the study.

Environmental management of moorland: Exmoor environmental management agreements and Environmentally Sensitive Areas

Exmoor Management Agreements

The first modern environmental management contracts offered to farmers in England were Exmoor Management Agreements. Two were concluded in 1979, and another 18 agreed during the following 25 years. This involved a total of 1,020 ha, giving an average of 51 ha per agreement, which ranged in size from one to 242 hectares (Lobley et al., 2005). These agreements "represented a considerable reassessment of the role of a farmer" (Lobley et al 2005 P iv). They have enduring local, national and international legacies. Locally, they changed the relationship between farmers and the National Park Authority. At the national level they provided the blueprint for the management agreements brought forward under the Wildlife and Countryside Act (1981). Internationally, their example was used to develop European agri-environment policy and were used as the basis of its first AES.

Exmoor Management Agreements were voluntary agreements between the Government agency, at that time English Nature, and individual farmers. They were designed to be flexible so that environmental management options could dovetail with farmer's existing farming systems as far as possible. Unlike current AES, compensation payments varied annually, depending on market prices.[1] These agreements were primarily motivated by concerns over the ploughing-up of moorland, so they focused on maintaining the quantity rather than the quality of the moorland. As such, they gave little thought to the wider landscape and habitat mosaic, and there was no need for them to confront the substantial difficulties of agreeing environmental management agreements over common land (Lobley and Winter, 2009).

[1] After 1990 the standard offer payment was based on a three year moving average to reduce annual impact of the cyclical changes in farming profitability on which the standard offer was based. This resulted in a smoothing-out of fluctuations in annual payment

Environmental Sensitive Areas (ESA)

Exmoor was designated an Environmentally Sensitive Area in 1993, and as a result existing Exmoor Management Agreements were converted into ESA agreements if they were renewed. However, the ESA scheme was less flexible that the Exmoor Management Agreements (Lobley and Winter, 2009, Short, 2000). ESA were structured into hierarchical tiers, with each Tier placing increasing restrictions on farming practices and increasingly demanding environmental management requirements. At the same time it was decided that ESS needed to address the unique features of open access moorland. Moorland is subject to property rights which extend beyond those attached to conventional freeholder land system. Many have unique environmental features and their farming relies on working practices and cultures honed from years of farming cooperatively when necessary, such as when gathering sheep of the fells. In part this is motivated by a lack of adequate fencing which allows sheep and cattle to move freely across moorland.[2]

It was decided that any ESS moorland agreement would be required to include all farmers whose stock had access to any part of the commons and the adequate representation of all remaining "rights holders" (which would include, for example, non-active graziers, non-farmer rights-holders and the owners of the commons). Moreover, ESA agreements would require a **single agreement** (Short, 2000) between these interested parties and Natural England.

To help operationalise these contractual requirements, Natural England worked closely with existing moorland governance organisations, for example, common land association. Through their work managing customs and practices, common land associations have helped to preserve the localised nature of common land. On those moorlands without functioning common land associations, or where through inactivity they had fallen dormant, ESA agreements provided a stimulus for their reinvigoration, however, in practice, many moorland ESA agreements were only concluded because some of the ESA restrictions and requirements were waived (Short, 2000).

[2] Not all stock do roam across open moorland. In many places sheep have developed a hefting instinct. As a result they spend their entire life on their own *heft* (small local areas). Lambs learn their heft from their mothers. However, some hefts overlap, which incentivises collaboration between the owners of the livestock.

The Wildlife Enhancement Scheme (WES) (1992-2008)

In 1992 the first Wildlife Enhancement Scheme (WES) (1992-2008) was introduced. WES agreements could be used either as stand-alone payments or as top-up payment attached to other AES agreements. WES offered an annual payment, based on individual management agreements, and could award one-off capital grants (English Nature, 1996: para. 3.16 & 3.17). WES was designed to be site specific and pro-active, to bring positive approaches to managing environmentally valuable land. Therefore they were valuable for fine-tuning ESS management agreements on high environmentally valuable sites (Short, 2000, English Nature, 1996). They were also used for piloting additional special management requirements (English Nature, 1996: p 20).

WES top-up agreements covering moorland, like ESA agreements over moorland, could only be offered following discussions between English Nature and the moor's commoners' association (or their sub-committee, the graziers association). Also, like ESA agreements, a single agreement between rights holders was necessary (English Nature, 1996: p 2). When it proved impossible to contact every rights holder, English Nature allowed agreements to be signed by the active graziers only. For example, this dispensation was offered to the Moughton Common, Ingleborough SSSI agreement, which was concluded with all the active graziers who together agreed to "maintain the management agreement even if the remaining five commoners start exercising their rights" (English Nature, 1996: p 6).

Summary

From the introduction of the Exmoor Management agreements in 1979, to the end of ESA (1992-2005), with the support of WES scheme top-ups, the basis of the AES contract over moorland changed. Initially these agreements were with individual farmers. But the unique nature of farming upland moorland created a need to consult with and include all rights holders into the AES agreement. A decision was also taken to replace individual farmer contracts with a single, moorland wide agreement, meant that EN/NE needed to work with individual representatives of all stakeholders who had legal interests over the land. In doing

so, they concluded the first over-arching AES agreements which involved cooperative/collaborative action between neighbouring farmers.

These agreements proved to be the forerunners to the landscape-scale impacts afforded under Environmental Stewardship Scheme (ESS) Higher Level Stewardship (HLS) (2005-2015), and the Countryside Stewardship's (CS) (2016-) Mid Tier, both of which are outlined below.

Farm boundary spanning impacts of Environmental Stewardship Scheme (ESS) Higher Level Stewardship (HLS) (2005-2015)

Potential "passive" landscape-scale impacts: the design of ESS-HLS

The Environmental Stewardship Scheme (ESS) (2005-2015) offered "broad and wide" Entry Level Stewardship and "narrow and deep" Higher Level Stewardship agreements. HLS agreements were largely restricted to designated high biodiversity valuable areas in England. AES agreements in these areas were competitive (often these were former ESA areas). Whilst ELS agreements were mandatory subject to accumulation of sufficient points (see below), HLS agreements were competitive. Applications needed to be submitted for appraisal to a Natural England Project Officers (NEPO), who, in general, required revisions before they were accepted.

The targeted conservation species and habitats are the same in each individual HLS area, and because of this all farmers in the same HLS area were offered the same environmental management options. As applications for ESS-HLS agreement were "expected" to include all of the priority management options, the choice of which options to include was effectively limited. Each NEPOs managed all the applications for the same HLS area, so they became aware of the key environmental features within each area. They had the knowledge and the authority, therefore, to ask farmers to revise their applications to take into account these wider landscape factors. By requiring changes to the selection and/or location of options they could integrate each application into the ecological network - although there is no concrete evidence that they did do this (Mountford et al., 2013). Whether they did or not, the fact that neighbouring farmer agreements were targeted at conserving the same species and habitats, by selecting the same or very similar environmental management options, provided the potential for creating landscape-scale impacts even though farmers themselves were not necessarily aware of this impact.

It is because farmers were not involved in farmer-farmer coordination/collaboration that such

impacts are referred to as "passive" – contracts were between NE and individual farmers. Any actual landscape scale impacts arose from the deliberate design and management of the submission to the AES. Therefore the likelihood of achieving landscape scale impacts would be largely dependent on the area of land enrolled in the scheme, the environmental features on the participating land, and the number of farmers who participated (Franks et al., 2017).

Potential "active" landscape scale impacts: ESS-HLS contracts which excluded option HR8 "Supplement for Group Action".

Natural England (NE) required all stakeholders who wished to submit a HLS application covering moorland to sign an internal agreement prior to submitting a single, joint application. NE required the internal agreement to cover specific aspects of the collaboration (outline details of which are presented in Appendix 1 (Natural England, 2011)). For example, all internal agreements had to set out each stakeholder's legal responsibilities for the delivery of the jointly selected management options. Because a single HLS application was submitted, the stakeholders (all of whom needed to be identified in the internal agreement) had to nominate a single person to act as their representative. This person sign the AES contract (the external agreement) with NE. The steps that needed to be followed, which are set out in Appendix 2, included setting up a joint bank account into which the entire AES payment was made (Short and Waldon, 2013: p 8).

In practice the specifications of internal agreements varied widely (Short and Waldon, 2013). For example, in their postal survey into how monies received under AES agreements over common land in England were distributed between stakeholders, Short and Waldon (2013)[3] found considerable variation in who received funding and that "the combinations of beneficiaries were complex".

> "Given the breadth of the NE guidance [on internal agreements] it is understandable that identifying who receives money under an AES agreement is going to vary from one common land agreement to the next" (Short and Waldon, 2013: p 8).

Nearly two thirds of commons agreements made specific provision for "administrative and secretarial" support, and although the majority of large commons did so, the amounts recorded were described as "very modest" (Short and Waldon, 2013). On average, across the

[3] Ninety-nine responses were analysed, covering 39% of the total common land in England, with the majority of responses from upland commons.

agreements, 77% of the AES payment was received by active graziers and 18% by the owners of the commons, but there was considerable variation between regions.

Potential "active" landscape scale impacts: ESS-HLS, option HR8 "Supplement for Group Action".

ESS-HLS offered farmers the first bespoke collaborative environmental management option available within any AES offered to farmers in England: HR8 "Supplement for Group Action". Farmers who chose to include it in their application received £10/ha/year as a contribution "towards the cost of facilitating communal agreements" (Natural England, 2010) – which was an allowable cost (under EU regulations; Article 39, 4 (Council of the European Commission, 2005)). These allowable transaction costs could include, for example, updating the grazing register, arranging meeting between stakeholders, drawing-up legal documents.

HR8 is an unusual environmental management option as it is an over-laying option **not** specifically an environmental management option. It could only be included in applications from farmers whose land included "boundary spanning eligible environmental features", such as inter-tidal flood management, wetland management and "landscapes with extensive archaeological or historic features" (Natural England, 2010). In such cases, at least two neighbouring farmers had to include option HR8 in their separate, individual applications. ESS-HLS HR8 options were most widely taken-up in agreements covering commons and moorland, particularly upland moorland - thus it formed a replacement to the existing moorland and WES/ESA+WES top-up agreements.

Table 1 presents details of the annual take-up of ESS-HLS option HR8 between 2005 and 2014. Table 2 summarises all AES agreements up to June 2014. In 2014, nine years after the option became available, it was included in 701 HLS agreements, only 5.2% of the 13,200 or so HLS agreements. ESS-HLS with HR8 options covered 102,000 ha, 8% of the area covered by HLS agreements. Table 3 shows the Natural Character Areas[4] within which ESS, HLS with HR8 options have been made. The majority of these agreements cover upland moorland, which tend to be part of larger than the average farms, thus explaining the higher proportion of land than farms enrolled into this option.

[4] All land in England is placed within one of 159 Natural Character Areas, which follow natural rather than administrative boundaries, based on a combination of geology, landscape and evolved fauna and fora.

Table 1. Summary of HR8 option agreements and areas

Date of start of agreement	Number HR8	Number HR8WF*	Total number of agreements	Area covered by HR8 option in given year	Cumulative area covered by HR8 option	maximum size	Minimum size
				(ha)	(ha)	(ha)	(ha)
2006	0	4	4	368.48	368.48	244.31	7.84
2007	0	5	9	1,967.02	2,335.50	992.75	10.72
2008	0	21	30	5,614.09	7,949.59	1,165.93	14.11
2009	16	7	53	8,095.64	16,045.23	2,365.62	0.14
2010	199	8	260	25,826.11	41,871.34	3,080.27	0.02
2011	119	0	379	8,624.43	50,495.77	1,190.75	0.01
2012	79	0	458	19,428.50	69,924.27	4,316.43	0.01
2013	148	2	608	21,324.71	91,248.98	3,247.20	0.01
2014	93	0	701	11,009.34	102,258.32	1,456.54	0.03
Total	**654**	**47**	**701**	**-**	**102,258.32**	**4,316.43**	**0.01**

*HR8WF were awarded to support the Water Framework Directive
Source: Natural England (Genesis Database)

Table A2. Environmental Stewardship facts and figures (as at 2 June 2014)

Scheme	Area (ha)	% of UAA	- /+ % in UAA** since 1 March 2010	Number of Agreements	-/+ of Agreements since 1 March 2010	Annual Value (million)
CSS	35,357	0.4%	**-3.5**	1,330	**-9,256**	£8.0
ESA	38,206	0.4%	**-4.6**	672	**-6,414**	£3.2
ELS	6,040,367	65.0%	**11.4**	45,101	**7,374**	£167.6
OELS	313,046	3.4%	**-0.7**	2,110	**-580**	£20.3
HLS (Combined with ELS/OELS*)	*1,141,889*	-	-	*11,760*	*7,802*	*£185.5*
HLS (Standalone)	139,934	1.5%	**0.7**	1,563	**997**	£26.0
Total HLS	*1,281,823*	-	-	*13,323*	*8,799*	*£211.5*
UELS	*1,324,215*	-	-	*7,959*	*7,959*	*£96.9*
Overall Total	**6,566,910**	70.7%	**3.3**	**51,885**	**-7,879**	**£410.6**

All these schemes are now closed to new applicants
** Most land in HLS is already accounted for in ELS or OELS. Numbers in italics not included in overall total.*
*** UAA is Utilisable Agricultural Area, by which is meant farmland and associated land such as woodland and scrub.*
Source: (Natural England, 2014)

Table 3. Detailed breakdown of location of HR8 agreements by year and National Character Area (NCA)

National Character Areas (NCA)	2006	2007	2008	2009	2010	2011	2012	2013	2014	Total
BEDFORDSHIRE AND CAMBRIDGESHIRE CLAYLANDS	18.70							95.14		113.84
BLACK MOUNTAINS AND GOLDEN VALLEY				740.50		50.38				790.88
BLACKDOWNS		94.68	66.16		24.10					184.94
BODMIN MOOR					1,200.66	883.76		1,401.08	467.16	3,952.66
BORDER MOORS AND FORESTS					541.29					541.29
CENTRAL NORTH NORFOLK	349.78									349.78
CLUN AND NORTH WEST HEREFORDSHIRE HILLS							17.19	175.32		192.51
CORNISH KILLAS					79.52	5.81				85.33
CUMBRIA HIGH FELLS					3,914.18		4,236.87	16,366.19	5,746.78	30,264.02
DARK PEAK									950.81	950.81
DARTMOOR		992.75	730.84	503.63	7,205.81	2,189.76	11,154.89		1,395.54	24,173.22
DORSET HEATHS			1,762.57							1,762.57
DURHAM MAGNESIAN LIMESTONE PLATEAU				48.71						48.71
EXMOOR					1,379.91	816.87			508.82	2,705.60
HOWGILL FELLS					2,404.14			1,037.18		3,441.32
MID SEVERN SANDSTONE PLATEAU				15.72			20.92	2.08		38.72
MORECAMBE BAY LIMESTONES								25.25		25.25
NORTH PENNINES			351.48			52.29		1,000.00	483.69	1,887.46
NORTH YORKSHIRE MOORS AND CLEVELAND HILLS			1,143.78	4,254.87	4,523.03	2,615.31	2,556.85			15,093.84
NORTHAMPTONSHIRE VALES					286.87					286.87
NOTTINGHAMSHIRE, DERBYSHIRE AND YORKSHIRE COALFIELD							256.15			256.15
SEVERN AND AVON VALES		58.94		82.95						141.89
SHROPSHIRE HILLS				2,449.26						2,449.26
SOMERSET LEVELS AND MOORS					80.22					80.22
SOUTH DEVON		809.93								809.93
SOUTH HEREFORDSHIRE AND OVER SEVERN					47.53					47.53
SOUTH NORFOLK AND HIGH SUFFOLK CLAYLANDS		10.72								10.72
SOUTHERN PENNINES			1,165.93		753.10	1,933.33	259.54	989.05		5,100.95
THE CULM			243.33			40.21				283.54
TRENT AND BELVOIR VALES								233.42		233.42
YORKSHIRE DALES			150.00		3,350.18	36.71	926.09		1,456.54	5,919.52
YORKSHIRE WOLDS					35.57					35.57
Total HR8 area added each year (ha)	**368.48**	**1,967.02**	**5,614.09**	**8,095.64**	**25,826.11**	**8,624.43**	**19,428.50**	**21,324.71**	**11,009.34**	**102,258.32**

ESS-Upland Entry Level Scheme; option UX1 "Moorland commons and shared grazing requirements

ESS also include an Entry Level Stewardship (ELS). These agreements required farmers to select environmental management options up to the value of 30 points for each hectare of land farmed, but as this was not a competitive scheme, once this points target was achieved the ELS application was accepted (paying a flat rate of £30 per hectare). However, in 2010 an Upland Entry Level Scheme was introduced which was designed to better dovetail into the farming practices of upland farmers than the ELS. The UELS introduced the second collaborative environmental management option, UX1 "Moorland Commons and Shared Grazing Requirements". The particularly innovative aspect of option UX1 was that it was compulsory for all farmers who farmed upland farmland managed by more than one farmer to include it in their application. It attracted a payment of £5/ha/yr. One result of its introduction was that option HR8 payments in ESS-HLS agreements made after this date were reduced, usually by an equal amount of £5/ha/year, to avoid any element of "double payment".

Countryside Stewardship (2016-) and provision for farmer-farmer collaboration under Mid Tier

Countryside Stewardship (CS) AES was introduced in England in 2016. It was designed, in part, as a response to the influential and independent Lawton report (2010) which demanded a "step change" in nature conservation. One element of this "step change" was to redesign AES so they offered farmers additional opportunities and incentives to cooperate/collaborate to better deliver landscape-scale impacts, and therefore could provide better support to and development of the existing ecological network. This approach was supported by the UK's Biodiversity Strategy (Defra, 2011a) and the UK National Ecosystem Assessment (UK National Ecosystem Assessment, 2011). As a result, the White Paper for Nature (Defra, 2011c) asked that farm-boundary spanning collaborative environmental agreements be at the heart of a reformed AE policy. Consequently, ESS was closed to new entrants, in 2014, and was replaced by Countryside Stewardship (CS) in 2016.

CS has three "structural" elements. CS Higher Tier is in some ways similar to ESS-HLS. Agreements are competitive, available only in high environmentally valuable areas, and it provided financial assistance to help farmers develop applications. The Mid Tier continues

the practice of offering a menu of environmental management options, each with points attached. But it is now also competitive. Points are totalled and used to rank applications. The highest ranking applications are funded in turn until the budget is fully allocated. A Capital Grant scheme form the third tier. It offers a maximum of £5,000/holding for undertaking environment-related works (Franks et al., 2017).

It is CS Mid Tier that offers incentivises for farmers to collaborate with one another. Four or more neighbouring (or mainly adjoining) farmers, farming at least 2,000 ha, can submit a single, joint submission.[5] The principal incentive offered is priority in the ranking of applications to CS Mid Tier, thus improving the chances of the application being funded (Defra, 2014). Although these are collaborative applications, submitted by at least four farmers, NE agrees management contracts with each farmer individually (thus moving away from individual contracts between a representative of the group and NE). CS has a "Facilitation Fund" of up to £1.2 million/year which is available to help farmer groups employ expertise to assist them to compile and submit their joint application. Eligible applicants to the fund must demonstrate they have the skills necessary to "help farmers, foresters and others to work together to deliver Countryside Stewardship priorities on a large scale across landscapes" (Defra, 2014).

It is too soon to know how many farmers have participated in CC-Mid Tier collaborative submissions, however, there are some practical barriers to their doing so: the need for at least four farmers to be in the agreement, the relatively large area requirements (suggesting it is aimed at moorland farmers), and no arrangements to address the possibility that farmers willing to submit a joint submission may have different end-of contracts dates for existing AES agreements (Franks et al., 2017).

Discussion: the evolution of cross-farm boundary environmental impacts

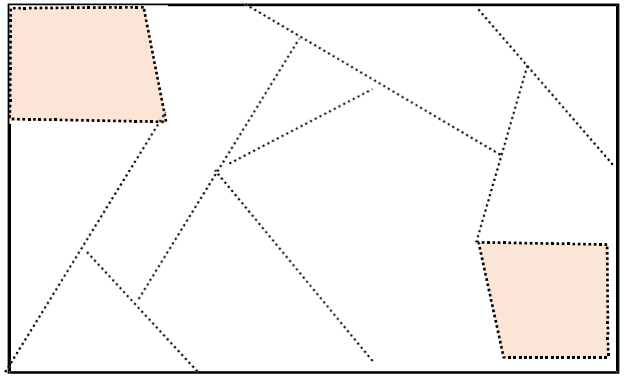
Figures 1 and 2 summarise the progression from ELS to ESS-HLS agreements. Figure 1 demonstrates the importance of participation rates for the delivery of "passive" cross-farm boundary landscape-scale impacts. If critical mass is absent, then it becomes difficult to link-up conservation areas regardless of which key environmental features are included in the applications. Figure 2 shows how ESS-HLS can capture additional "economies of

[5] This area refers to the area farmed by the farmer group, not to the area of land entered into the Mid Tier conservation application.

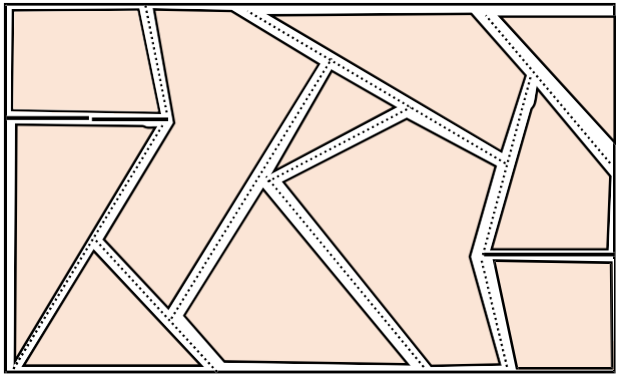
configuration" though its design features: namely, applying only to geographically restricted areas, all agreements focused on the same target conservation species and habitats, the de facto impact that all applications will include the same, or largely similar, selection of environmental management options, and the need for them to be critically assessed before being accepted. The right hand diagram in Figure 2 shows how cross-farm boundary designed environmental management options (e.g. HR8) can help deliver cross-farm boundary environmental impacts. By requiring "active" cooperation/collaboration between participants, such options can add to the "passive" landscape-scale impacts achieved through ESS-HLS agreements.

Figure 1. The importance of critical mass of participators for effective landscape-scale environmental management.

Distribution of farms across a landscape



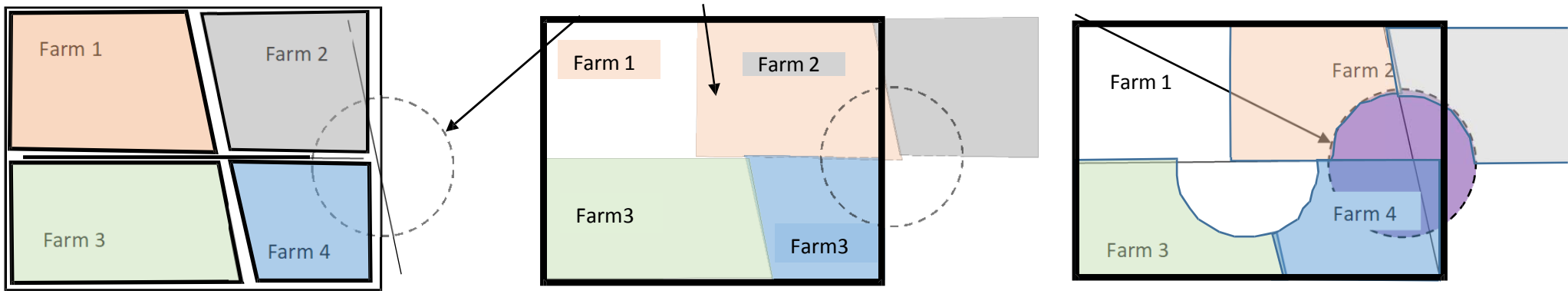
ES-ELS scheme with limited uptake. Each farmer submitted an individual application to ES-ELS, which covered their own land only. Environmental management options selected from a wide range of options. Applications were not competitive. In this landscape, only two eligible farmers have enrolled onto the scheme, given little or no effective landscape scale impact.



ES-ELS scheme with 100% participation of farmers across the landscape. Each farmer submits an individual application to ES-ELS, which covered their own land only. Environmental management options selected from a wide range of options. Applications were not competitive. In this case, all eligible farmers have enrolled, giving some degree of landscape scale impact.

Figure 2. The use of ESS-HLS option HR8 to secure collaborative environmental management across upland landscapes.

HR8 eligible environmental feature which spans the land farmed by all four farmers.



ES-HLS scheme agreements. Each farmer submitted an application to the application, which covers their own land only. However, (i) small geographical area with (ii) same target conservation species, so (iii) all farmers have a limited number of environmental options to select from. And (iv) scheme is competitive, so NEPO can recommend revisions to application.

ES-HLS upland common land agreements, excluding option HR8. Defra required a single application which represented all rights holders to the area of commons land entered into the agreement. Farmers jointly decide (i) which options to apply across the entire commons, and (ii) which to apply to their own commons land. These are recorded in an **internal agreement** and all payments made into a single bank account. All rights holders must agree and sign an internal agreement. Subject to HLS restrictions over (i) similar conservation targets, (ii) limited choice of environmental management options and (iii) competitive scheme, and (iv) is subject to NEPO required revisions.

R8 upland common land
The same as an ES-HLS
mon land agreements, but with
of a specific cross-holding
al management option (HR8).
the **internal agreement** must
how the HR8 payment is to be
een rights holders.

Table 4 summaries each AES by their key features from the perspective of their potential environmental impacts at the landscape-scale: whether they stimulate individual or collective collaboration; are they restricted to a clearly defined geographical area; do scheme requirements effectively limit the number of environmental management options available for selection; does the scheme include specific cross-farm border environmental management option; and are they competitive schemes. These characteristics are used to categorise the "collaborative power" of each scheme. For example, the ELS with few participants delivers no landscape impact (have no "power"), whereas ESS-HLS agreements which include HR8 are the most powerful. The following section examines the future of the landscape-scale element of AES.

Table 4. Summary of the evolution of cross-farm boundary environmental impacts from AES

Scheme name	Critical mass*	Individual (i)/ collective contract (Σ)	Clearly defined geographic area	Limited number of EM** option choices	Specific cross-farm border EM option	Competitive	Net work character	"Collaborative power"
Entry Level Scheme	☒	*i*	☒	☒	☒	☒	Farmer-GA	None
Entry Level Scheme	☑	*i*	☒	☒	☒	☒	Farmer-GA	Limited
Higher Level Scheme	☒	*i*	☑	☑	☒	☑	Farmer-GA	Weak
HLS – on common land	☑	Σ	☑	☑	☒	☑	Farmer-Farmer	Strong
HLS – on common land + HR8	☑	Σ	☑	☑	☑	☑	Farmer-Farmer	Extra strong
CS Mid Tier – on HLS common land	☑	Σ	☑☑	☑	☒/☑	☑	Farmer-Farmer	Super strong
*Classification differentiates between scheme which do and do not achieve critical mass of participants. **EM environmental management.								

Future developments of landscape-scale impacts through AES

Changes in the design of AES in recent years have been in driven by budgetary constraints and the need for them to be more effective. This has led to concerns over payment rates and transaction costs, and has increased the targeting of resources to high environmentally valuable areas, a mechanism designed to deliver improved value for money (European Court of Auditors, 2011). This discussion briefly considers the impact of Brexit on AES. It then considers a mechanism by which joint contracts can reduce scheme transaction costs, and how hybrid public-private AES can offer greater financial incentivises to participants of

jointly submitted landscape-scale applications. Finally it considers the weaknesses of the CS's Mid Tier scheme, and proposes changes which would both make it more attractive to farmers and help it to deliver improved value for money.

Brexit and AES and AE policy

During the 2014-2020 CAP negotiations, Defra commented that there was "little rationale" for direct payments, because "they are not targeted on any particular market failure, and provide little value for money for the taxpayer" and that "other forms of public expenditure can usually demonstrate greater benefits than direct payments" (reported in Buckwell, 2016: p 33). This implies that Defra might not be opposed to redirecting at least some proportion of the direct payments (some £2,313 million in 2014 (Buckwell, 2016)) to the AES budget. Or these funds might be redirected to other sectors, because the CAP budget will no longer have the protection of being agreed at the European level (Helm, 2017).

Although the overall impact of Brexit on the available budget is uncertain, it is unlikely to have any fundamental impacts on the design and evolution of AES because AES are already managed according to the principle of subsidiarity. This means that the EU Commission already grants Member States wide ranging powers to design AES to best address the country's own environmental characteristics, issues and problems.

However, there remains much uncertainty about the future of wider environmental regulations. The government intend to convert all existing EU legislation into UK legislation under sweeping new powers proposed by the "Great Repeal Bill". In doing this, it intends to reserve the right to use "statutory instruments" which would allow it to revise the statute book without needing the permission of Parliament (Roberts, 2017). This could be used as an "undercover" mechanism to remove EU legislation from the statute book.

Increased targeting of resources and transfer of transaction costs to farmers

Integrating every farm's spatial environmental features into landscape ecological networks would require individual farm by farm bespoke contracts. Micro-management on this scale would incur substantial transaction costs which currently are largely borne by the government agency. Bespoke contracts would become a more realistic possibility of a mechanism could be agreed to voluntarily move some of these transaction costs onto the participating farmers.

Creating additional opportunities for farmers to submit joint contracts would be a vehicle to enable this.

Joint contracts require farmers to agree between themselves their individual and collective contribution to a single application. Current payment rules allow these farmers to be compensated for the higher transaction costs joint contracts incur. The higher payment would increase the financial incentives for farmers to participate in the AES, and in collective contracts. There would remain a need for a competitive selection process to help ensure value for money, and these costs would continue to be borne by the government agency. But if farmers incur lower transaction costs than the government agency would have done in managing a large number of applications, this change would deliver budgetary savings. Moreover, if landscape-scale schemes are more effective than farm- and field-scale schemes, the switch from many individual to fewer joint contracts would increase the environmental benefits, providing a second mechanism for raising the scheme's value for money.

There is evidence from a voluntary, randomly stratified survey conducted by Defra that farmers are willing to collaborate to jointly deliver environmental goods. It reported that "45% of farm businesses [a total of 567 businesses] were working with others to deliver environmental benefits" (Defra, 2013: p 18).[6] Although only 12% of the 567 farms participated in "farmer-driven co-ordination of environmental activities and benefit with neighbouring farmers" (Defra, 2013: p 18), more than a half of them were "involved in passive engagement through third-party bodies" to deliver environmental benefit. Although the criteria used to identify "involvement in passive activity" was somewhat generous, namely they had attended "a discussion group at least three times a year which has been organised by a third party and which includes discussions about environmental benefits" (p 18), this evidence shows that farmers understand the potential role collaborative action can play in environmental management. A survey by Franks *et al.* (2017) showed the many examples of the private, cross farm boundary conservation schemes farmers might be engaged in. These included, for example, Nature Improvement Areas,[7] Local Wildlife Trusts, Conservation Grazing trusts and organisations, Forestry Commission schemes, and the Partridge Count Scheme.

[6] Lower performing farms were found more likely not to collaborate than higher performing farms (68% and 47% respectively). Cereal farms were the most likely (48%). The survey found significant regional differences. Results are from 1,248 respondents.

[7] Nature Improvement Areas, established in 2012, are large-scale, landscape spanning initiatives aiming to improve ecological connectivity and biodiversity.

Developing hybrid payment systems and non-financial incentives

Payment for Ecosystem Services (PES) refers to schemes which shift some of the costs of AES from the public to the private sector. PES schemes require the beneficiaries of farmers' conservation land management practices to finance compensation payments (Dunn, 2011). Therefore, a key requirement of PES is that they are effective. As a consequence, they tend to be narrowly drawn, to focus on environmental benefits that are measurable and for which there are effective environmental management options. The focus on a narrow bundle of ecosystem services is one disadvantage of these schemes, but many do exist, and many of those that exist involve water management at the landscape scale (URS- Scott Wilson, 2011). In England, for example, South West Water is the beneficiary of the "Upstream Thinking" scheme which covers the River Fowey catchment in Cornwall (South West England). South West Water employs a third party, Westcountry River Trust, to approach farmers and arrange mutual benefits scheme. Changes to farming practices tend to be for between 10 and 25 years, with the constraints to farm management practices recorded on the farm's Land Deeds.

As PES are market-based mechanisms, the size of the payments are not subject to the EU/WTO rules which govern the value of the compensatory payments allowed for AES. Currently, compensation is limited to profit foregone, direct (one off) costs and their transaction costs. There is substantial evidence that the value of compensation payments, and the degree of change required to farming systems to comply with AES environmental management options are two significant determinants of the participation decision (Wilson and Hart, 2001, Siebert et al., 2006).

Because PES are not subject to EU/WTO rules which limit the financial incentives which can be offered to participating farmers, they can be integrated into public-private hybrid schemes. Such hybrid schemes would allow the government agency to compensation farmers for changing activities which raise the provision of environmental goods above the baseline provided by the co-production of environmental goods from commercial agricultural activities. They would then allow a private benefactor of further additional specific changes in farming activity, designed to enhance specific environmental benefits, to pay farmers an additional fee. This would overcome one of the principal weaknesses of Payment for Ecosystem Services contracts, namely that they tend to be narrowly specified to focus solely on the single environmental benefit which most benefits the benefactor. Such a development

would take account of the need stated in the UK government's Natural Environmental White Paper to "encourage and facilitate greater use of PES in the future, especially as part of a broader mix of policy instruments" (Dunn, 2011: p 2).

Proposals to develop Countryside Steward's Mid Tier

Although CS Mid Term is a "step change" in facilitating more farmers to engage with neighbours to cooperate/collaborate their environmental management activities its terms and conditions are limiting. These terms and conditions could be amended so as to increase incentives and widen the opportunities for even more farmers to work together to jointly submit a single application. Proposed revisions to Mid Tier are presented in Table 5.

Table 5. Suggested revisions to CS's Mid Tier.

Terms of CS Mid Tier	Proposed revisions
Need at least 4 farmers to work together	There is no justification for requiring at least 4 farmers. The number of farmers participating in a joint contract should be two or more.
Area farmed by the farmer group to be at least 2,000 ha.	Not all this area needs to be entered into Mid Tier, which suggests there is no benefit of establishing minimum farmed areas for joint contracts.
Mid Tier has no geographical priority area for joint contracts	Not all areas have the same requirement for joint contracts to deliver an improved ecological network. Given budget constraints, landscapes that would particularly benefit from joint schemes should be identified and prioritised for joint contracts.
Different ending date for existing AES contracts	When UELS was introduced farmers with ELS contracts were allowed to end them early if they applied for UELS agreements. This precedence should be extended to allow early exit from existing AES contracts provided the farmer has submitted a collaborative contract which has been accepted onto the Mid Tier.
Limited non-financial incentives	Organic farmers receive derogations which excuse them from needing to comply with "greening" to secure their full Single Farm Payment. Such derogations could be extended to farmers who participate in joint schemes.
Limitation on financial incentives	Develop hybrid payment systems, under which government agency pays for the wider environmental benefits from land and private benefactors pay for specific environmental benefit above the base-line needs for the improvements to the ecological network.

Conclusions

If collaborative schemes do deliver "economies of configuration", and this will need to be studied and confirmed, then it is likely they will become more widely used instrument to deliver value for money based on lower transaction costs and increased effectiveness. The type of cooperation/collaboration incentivised by AES, whether "active" or "passive", farmer-farmer or farmer-third party, should be the simplest necessary to deliver the targeted environmental goods, because this will help keep transaction costs low. The nature of the collaborative interaction will chiefly depend on the characteristics of the targeted species, habitats and landscapes. In turn, this will determine the scale of the cooperation needed, area of land involved and number of farmer participants. This places substantial requirements on the development of detailed maps of existing ecological networks and options for their enhancement by inclusion of environmental features on land farmed by farmers who apply to participate in landscape scale, competitive AES.

The Defra survey (Defra, 2013) suggested that farmers are aware of the potential benefits of managing the environment at the landscape scale. Many are already involved in cross-farm boundary discussion groups and private landscape-scale environmental collaborative ventures. The CS's Mid Tier widens the opportunity for farmers to participate in formal AES joint schemes. As such it does represent a "step change". Time will tell if this innovation have proved sufficiently attractive to farmers. Whether it is judged a success or not, it is likely to undergo revisions in the way all AES schemes have been revised to take into account additional knowledge. Several changes which would make it even more attractive to farmers are proposed which, if implemented, would help joint contracts to underpin the structure of formal AES for many years to come.

Appendix 1: The internal agreement between stakeholders applying for an AES to cover common land

The internal agreement needs to be a robust legal document that can deal with unforeseen events. It must make clear to the commoners their responsibilities, the ground rules that will apply and what the sanctions are if they breach the terms of the agreement and how the association will divide and distribute the money. There are solicitors and land agents who specialise in commons and they will be able to use an existing pro forma to help draw up the internal agreement. Land agents can advise on the available and required clauses for the different strands of ESS agreements. If the document is to be signed as a deed then a solicitor needs to be party to the drafting. The internal agreement should address the following issues:

- Involvement of non-graziers
- Live register – keeping track of numbers and types of grazing livestock
- Stocking levels depending on the objectives of the ESS agreement
- Adjustments to stocking levels in the event of new graziers (i.e. when a maximum level of stocking is required)
- Payment schedules for the distribution of money
- Contingencies, e.g. as a result of resignations, new graziers, breaches by those involved in the agreement
- Binding successors in title
- Dispute resolution mechanisms
- Compulsory gathers in event of breaches and disease
- Sanctions / penalties
- Appointment of officers, roles and responsibilities
- Voting system for rule changing.

The agreement needs also to be managed, along with the AES payments. The following list provides guidance on the issues involved in the effective operation of agri-environment agreements.

- Hold AGMs and meetings to allow problems to be aired– more often if necessary
- Appoint a treasurer or use an agent to distribute payments
- Ensure there is a cash reserve for audit fees, agent fees and any possible contingencies.
- Monitor changes to agri-environment payment levels
- Keep track of opportunities to upgrade the agreement if circumstances change
- Note the date of any break clauses and activate if necessary
- Decide in advance what to do in the event of new graziers who have not signed-up to the agreement and implement the measures if necessary so that the agreement is not breached
- Live registers are useful for management purposes, and are a requirement for UELS and should be updated annually
- Where extra shepherding is difficult, consider clubbing together to employ a contract shepherd
- Ensure that there is a mechanism to address breaches in the agreement should they occur so that the remaining commoners are not penalised by one person's action. Deduction and withholding payments can be a useful deterrent.

(Natural England, 2011)

Appendix 2. Steps that are needed for ESS application over common land or shared grazing.

Step 1	If not in existence already, and if required, set up a Commoners' or Graziers' Association to represent all of those who will be actively managing the common or shared grazing for the purposes of delivering your ES agreement. • Establish a bank account on behalf of the Commoners' or Graziers' Association.
Step 2	If not already registered, register the commoners' or graziers' association as a customer with the Rural Payments Agency (RPA) to: • Obtain a Single Business Identifier for the commoners' association or graziers' association (if your commoners' or graziers' association already has an SBI, please first check with the RPA that the existing SBI will be valid for your new agreement). • Obtain a unique vendor number to ensure payments can be made to the association's bank account. • Obtain a County, Parish, Holding number for the common or area of shared grazing, if you are applying for HLS. • Authorise the individual who will act as the main business contact on behalf of the association. • Register all those who are participating in the ES agreement against the SBI.
Step 3	Register the common or shared grazing onto the Rural Land Register with the RPA, who will send you a map of the common to which you will need to refer when requesting an application pack.
Step 4	Contact Natural England for an application pack.
Step 5	Negotiate an internal agreement between all those who wish or should participate in an ES agreement, i.e. those who actively manage the common or shared grazing and who will contribute to the management required under the ES agreement.
Step 6	Complete your application (following the procedures set out in the ELS/HLS handbooks as necessary), including the supplementary form (which conveys the consent of the owner of the common or shared grazing). HLS applicants will also need to submit a completed Farm Environment Plan (FEP).
Step 7	For ELS and Uplands ELS applications without HLS, await approval of your application by Natural England. For HLS applications await an offer of an agreement by Natural England and then decide whether to proceed.

Defra (2011b) Common land and shared grazing supplement to the Environmental Stewardship Handbooks (page 2 and 3).

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