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Farmer attitudes to cross-holding agri-environment schemes and their implications for Countryside Stewardship

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ABSTRACT

A literature review and on-line consultation (of 122 respondents from across the UK) revealed farmers' perspectives of cross-holding agri-environment schemes (AES). The main concerns raised included; a culture of independent working, lack of existing farmer networks, the validity of farmer-farmer contracts, inadequate financial compensation, the need for third party support, farmers' lack of knowledge of the environmental benefits of AES, and the scheme's "small print". The consultation added the following concerns; the need to offer "collaborative" and "coordinated" environmental management options, the belief that neighbours would not make willing or suitable collaborators, and possible facilitation of the spread of pest and diseases, including non-native invasive species. It uses these research findings to identify which of these concerns have been taken into account in the design of Countryside Stewardship (CS) the recently introduce replacement in England of the Environmental Stewardship Scheme. Suggested changes that may increase CS's effectiveness in enhancing ecological networks include; provision of up-front financial support to farmer-group applications, allowing existing AES agreements to end before their due dates, and removing restrictions on the use of the Capital Grants element. Offering additional resource-based incentives to farmer-group applicants, such as reducing the area of land entered into "greening", can be justified if the expected environmental benefits from cross-holding collective action do materialise.

KEYWORDS: Countryside Stewardship; Mid Tier; landscape scale; agri-environment scheme; collaboration

1. Introduction

The first environmental scheme in England to financially compensate farmers for loss of income associated with changes to farming practices designed to benefit the natural environment was the Exmoor Management Agreement Scheme (Lobley and Winter 2009). Introduced in 1979, it became the blueprint for compensation arrangements under the UK's Wildlife and Countryside Act (1981) and, by extension, for European agri-environment schemes (AES), under EEC Regulation 797/85 and 2078/92 (Lobley *et al*. 2005). The initial AES have evolved to reflect experiences gained, changing environmental concerns and new understandings of ecological systems and networks (Cooper *et al*. 2009, Latacz-Lohmann and Hodge 2003, Lawton *et al*. 2010, Whitby 2000). The growth of landscape scale conservation thinking (Adams 2015, Lefebvre *et al*. 2014) is a part of this evolution which has been incorporated into Countryside Stewardship (CS) (2015-present), the AES which replaced the Environmental Stewardship Scheme in England (2005-2014). The Mid Tier of CS includes an incentive for groups of 4 or more farmers to participate in cross-holding environmental management by submitting a single, joint application. This innovation was introduced, in part, to address criticisms such as that in the White Paper for the Environment "*The Natural Choice: Securing the value of nature*" (HM Government 2011), which described the Environmental Stewardship Scheme as adopting a "piecemeal" approach which took "place on too small a scale to achieve overall success" and which, as a consequence, overlooked "crucial links, such as between wildlife sites and the wider countryside" (p 3) (HM Government 2011). It also reflects the increasing body of scientific evidence that demonstrates environmental management to be more effective when carried out at the landscape rather than the field or farm scale (Donald and Evans 2006, Dutton *et al*. 2008, Gabriel *et al*. 2010, McKenzie *et al*. 2013, Webb *et al*. 2010, Whittingham 2007).

It is widely acknowledged that the success of CS, as with all voluntary AES, requires land managers to be positively engaged with the scheme (Radley 2013, Wilson and Hart 2001). Indeed, the influential UK government commissioned, but independent, Lawton Report (2010)

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described farmers as "the bedrock of an effective [ecological] network" (p 58), and the White Paper for the Environment acknowledges the "vital role" they play in "achieving society's ambitions for water, wildlife, healthy soil, food production and the management of landscapes"(p 23) (HM Government 2011). It is because of this important role that farmer participation in AES has been widely studied (Brotherton 1989, Lastra-Bravo *et al*. 2015, Mills *et al*. 2013b, Prager and Freese 2009, Reed 2008, Siebert *et al*. 2006, Wilson 1996, Wilson and Hart 2001). Nevertheless, relatively little is known about UK farmers' attitudes and motivations towards cross-holding environmental management schemes. This compares unfavourably with our understanding of farmer participation in collective action in environmental schemes elsewhere, for example in Australia (Wilson 2004); Germany (Prager and Nagel 2008, Prager and Vanclay 2010); The Netherland (Franks 2010, Franks and Mc Gloin 2007, Renting and van der Ploeg 2001); America (Finley *et al*. 2006, Stevens *et al*. 1999) and in other selected OECD countries (OECD 2013).

The principal aim of this research is to address this deficiency, to explore farmers' perspectives on working collectively in formal AES. It reviews studies of UK farmers' views towards actual and hypothetical cross-holding, environmental management schemes found in the UK, and adds to this evidence by reporting findings from an on-line consultation in which UK farmers present their views on how the design of cross-holding AES might influence their participation decision. It then examines which of these findings have been incorporated into the design of CS, to suggest changes that may raise participation rates and therefore its effectiveness. The following section reviews the literature on UK cross-holding, landscape scale stewardship to identify farmers' perspectives of the barriers and the benefits of cross-holding environmental management schemes. Section 3 presents details of the on-line consultation exercise, and Section 4 reports the findings from the consultation. Section 5 discusses the implications of these findings for the design of cross-holding AES. Section 6 examines the extent to which the design of CS's Mid Tier incorporates farmers' views and concerns. Section 7 concludes by linking the effectiveness of landscape scale AES to an increase in the incentives offered to farmers to submit group applications.

2. Review Of Uk Farmers' Attitudes Towards Cross-holding Environmental Management

There have been many studies of the attitudes and views of non-UK farmers and land managers towards cross-holding environmental management initiatives (Prager and Freese 2009, Prager and Nagel 2008, Prager and Vanclay 2010, Primdahl *et al*. 2003, Primdahl *et al*. 2010, Renting and van der Ploeg 2001, Slangen and Polman 2002, Wilson 2004, Wiskerke *et al*. 2003). Two recent studies have reviewed this literature (Prager 2015, Prager *et al*. 2012). However, in a review of about 160 peer-reviewed publications on farmer participation in AESs, Siebert *et al*. (2006) concluded that the design of AES must be sensitive to local ecological, economic and social conditions, and to cultural preferences. These findings suggest that the attitudes and views of non-UK farmers may not form an especially reliable basis upon which to design innovative cross-farm AES for the UK. For this reason the literature review in this Section is restricted to collective environment-focused schemes and research applied to the UK.

The studies summarised in Table 1, which offer farmers the opportunity to join actual or hypothetical cross-holding schemes, found that most farmers would consider collaborating with neighbours in cross-holding AES (Dutton *et al*. 2008, Emery and Franks 2012, Franks and Emery 2013, MacFarlane 1998). However, when cross-holding environmental option HR8 was offered in Environmental Stewardship Scheme, its uptake was low (Franks and Emery 2013). The studies in Table 1 identify the barriers that prevent farmers turning interest into participation as:

- the preference of many farmers to work independently (Davies *et al*. 2004, Emery and Franks 2012);
- a lack of a pre-existing network or organisation which bring farmers together (Davies *et al*. 2004, Franks and Emery 2013);
- concerns about trust between members, typified by worries over the diversity of stakeholders interests (Franks and Emery 2013) and the enforceability of contracts (Emery and Franks 2012, Mills *et al*. 2011);
- the need for adequate financial compensation (Davies *et al*. 2004, Emery and Franks 2012, Franks and Emery 2013, MacFarlane 1998), even when farmers appreciated the environmental benefits of their collective action (MacFarlane 1998);
- a need for support from external advisors to arrange farmer meetings, lead group development and coordinate the submission of paperwork (Davies *et al*. 2004, Dutton *et al*. 2008, Emery and Franks 2012, Franks and Emery 2013, Mills *et al*. 2011, Southern *et al*. 2011);
- uncertainty about farmers' knowledge of environmental benefits arising from AES in general, and of landscape scale collective action in particular (Davies *et al*. 2004, Mills *et al*. 2011), and
- barriers imposed by the terms and conditions attached to cross-holding environmental management options, such as its competitiveness, and how individual farmer's AES payments are made (Davies *et al*. 2004, Franks and Emery 2013, Mills *et al*. 2011).

Research shows that many of these barriers also apply to farmers decision to participate in conventional, farm-by-farm AES (Siebert *et al*. 2006), but perhaps three have special relevance to joint-applications: the preference of many farmers to work independently, which is further exacerbated in areas without pre-existing support networks; specific financial issues raised by collective contracts; and the design of cross-holding schemes, including the validity of farmer-farmer contracts.

Preference for independent working and third party support

The preference for independent working is a cultural as well as an economic issue. It is not surprising that cultural attitudes can provide a significant stumbling-block to the introduction of innovative practices (Emery 2015, Siebert *et al*. 2006). However, several studies

Table 1: Summary of published literature of cross-holding collective action in the UK

Name of author(s) and date published	Location	Typical environment and farm type	Number of farms involved	Neighbouring farmers	Governance of landscape scale benefits	Details of inter-farm scheme	Principal research findings
MacFarlane (1998)	Lake District, England	Upland Cattle and sheep	35 of 46 in target area sympathetic to the proposed scheme	Contiguous, within a ring block (ESA area)	Collaborative, with third party support in start-up phase	[Hypothetical scheme] Farmers invited to join a hypothetical third tire of Environmental Sensitive Area (ESA) payment to agree to manage features which crossed farm boundaries'' (p 583-585).	Support for cooperation underpinned by additional financial gain not by potential conservation benefit realised by cooperative action. Farmers with good relationships with neighbours more likely to respond positively
Dolman *et al.* (2001)	Oxfordshire, England	Lowland, river plain, arable	Initially supported by 15 out of 31 farmers approached, but all 17 subsequently interviewed supported scheme	Contiguous area of 110 square km	Collaborative, third part support in start-up phase	[Hypothetical scheme] Farmers invited to support a hypothetical, intra-farm, wider landscape management	Support for the scheme increased as farmers understood the likely ecological benefits. Visualisation of proposed scheme increased farmer support.
Davies et al. (2004)	Scotland	Covers a cross-section of Scottish farming types, including crofting	17 existing environmental collective action groups (detailed analysis of 5 farmer-led collective actions	Close neighbours of one another	Farmer-farmer collaborative actions	[Funded Schemes] Included examples of bottom-up, farmer led collaboration and coordinated, third party supported collective action.	Farmers predominantly focused on business profitability; farmer's preference to work independently rather than in groups; farmers unlikely to be able to identify environmental benefits of cooperative action; difficult representing their own interests in the development of AES; development of existing informal networks rather than creating new ones.
Parrott and Burningham (2008)	Blackwater Estuary, Essex	Low-lying arable and grassland	14 stakeholder interviews. No support for the option by farmers interviewed.	All farmed land in the Blackwater area suitable for intertidal habitat creation option	Collaborative, third party support only in start-up phase	[Hypothetical scheme] Farmer were interviewed to obtain their views of ESS's HLS ''intertidal habitat creation'' option.	Little support for the option due to: irreversibility of land use change;concern over the size and duration of compensation payments;upfront costs not repaid until farmer accepted into the scheme; scheme too complex; farmers did not understand the need to create saltmarsh for conservation purposes;lack of confidence in design of scheme option as no direct evidence of benefits available.
Dutton *et al.* (2008)	Chichester Coastal Plains, West Sussex	Arable farming, producing vegetable and salad crops.	Targeted 42 farmers, all with contiguous land-holdings in the project area	All within the 10,000 ha target area	Cooperative, (farm specific conservation plans), organised by third party	[Funded scheme] Countryside Stewardship Scheme financed bespoke farm conservation plans provided by third party in consultation with farmers.	Farm-specific advice and bespoke conservation plans resulted in reduced farmer transaction costs; all farmers carried out some conservation work; 11 implementing relevant conservation work, and 31 joining the proposed scheme. Scheme allowed habitat corridors to be built between farms. Involved higher initial costs setting up the scheme

Table 1. (*continued*)

Name of author(s) and date published	Location	Typical environment and farm type	Number of farms involved	Neighbouring farmers	Governance of landscape scale benefits	Details of inter-farm scheme	Principal research findings
Southern *et al.* (2011)	River Glaven catchment, north Norfolk	Arable farming on mostly Grade 3 land	27 farmers and 12 non farming landowners among 71 contacted stakeholders	All farmers live and work in the project area	Collaborative with third party support in start-up phase	[Hypothetical scheme] Adaptive framework to allow farmers to developed landscape scale scenarios.	Principal problems relate to lack of trust and clarity over environmental policy in general, short-term nature of environmental policy, and practical implementation of landscape scale conservation, including governance arrangements. Initiation of landscape scale scheme would need help from external agent (e.g. a Project Officer), with partnership built on existing functioning partnerships, e.g. River Glaven Conservation Group
Mills *et al.* (2011)[1]	Case studies of exiting collective actions in Wales	Wide range of farming types involved	13 case studies	All actively involved in existing collective actions	Collaboration, (direct governance), third party only involved in start-up phase	[Existing collective actions] Landscape scale, voluntary participation, groups. Built from existing network of farmers with shared traditional values and similar farming systems	Able to develop scheme adapted to local features and farming systems, members with common aims, strong local leadership, limited group size allows all to contribute to problem solving; payments distributed among the group by agreed contract. Third party only used to facilitate start-up and supply training needs as required.
Emery and Franks (2012)	Three case study areas in England	Arable, mixed farming, livestock farming	33 farmers in total, (12, 10 and 11 in each case study area)	All farmed in one of the three case study areas	Farmers preferred coordinated, third party supported schemes & options	[Hypothetical scheme] Farmers were not given any guidance on the possible design of a landscape scale scheme	Overwhelming support for the principle of landscape scale schemes. Principal barriers included; farmers preference to work independently showed strong cultural barriers to working together; majority supported third party overview; Perceived unwillingness of neighbouring farmers to participate; contractual issues; need for demonstrable benefits; and scheme flexibility, with respect to range of options available to select from.
Franks and Emery (2013)	Across England, but mostly upland areas	Livestock farming	18 farmers, all participants in option HR8 in the EES's HLS	Spread across England	Collaborative, third party often involved, but only in start-up phase	[Funded scheme].Neighbouring farmers with boundary spanning environmental features can include Option HR8 in their AES agreement.	Flexibility of HR8 option is important. Generally attractive payments. Many agreements are agreed between farmer members of existing groups. Principal problems included; Need for a third party to initiate initial discussions; competitive nature of HLS; need to finance up-front costs;agreeing primary use of land; contractual arrangements.

[1]This paper draws upon the findings of two research projects undertaken between 2004 and 2008 (Mills *et al*. (2006) and Mills *et al.* (2008)).

demonstrated the positive impacts that external advisors can make to address this barrier. Davies *et al.* (2004) suggested that "collective action coordinators" could help farmers identify local opportunities and respond to local circumstances; strengthen existing farmer-farmer networks; develop additional funding streams; and encourage farmers to become involved in local initiatives and programmes. Dutton *et al.* (2008) suggest external advisors would ideally work on a one-to-one basis with individual or groups of farmers. By bringing farmers together to discuss their options, collective action coordinators would help build viable farmer-groups, and in so doing increase the number of farmer-group applications. Franks and Emery (2013) found the majority of Higher Level Stewardship agreements that included the cross-holding option HR8 had been facilitated by a third party, including Natural England Project Officers, LEAF (Linking Environment and Farming), a National Parks Project Officer and specialist land management and grazing conservation trusts. Franks and Emery's (2013) study of HR8 agreements on moorland found higher support for third party assistance from farmers of moorland which has a wide diversity of stakeholder interests leading to conflicting views on the primary use of the farmland, and where local Moorland Management Associations were non-existent or lacked vitality.

Scheme financial arrangements

Research showed that joint applications required up-front finance to pay for group meeting and to prepare contracts (Franks and Emery 2013). This suggests the current practice under Higher Level Stewardship of providing financial support for external assistance to individual farmers to develop their Higher Level Stewardship applications - which is not redeemable if the application is rejected - should be extended to farmer-group applications.

Several authors believe voluntary collective action schemes would not be possible without additional financial incentives. Southern *et al.* (2011), noting the lack of any strategic governance framework for delivering an integrated approach to landscape scale environmental management, suggested the State may need to lease or purchase areas of land which have high environmental value. Parrot and Burningham (2008) suggested introducing a "joint application payment", much along the lines of the amalgamation bonus payment suggested by Parkhurst *et al.* (2002) and Goldman *et al.* (2007). But such payments are not permitted under current AES rules (Rodgers 2004).

Scheme design

Barriers to participation can also be related to the terms and conditions of AES and their individual environment management options. The only formal UK agri-environment related experience of joint submissions available to provide guidance on the design of Mid Tier was the Environmental Stewardship Scheme's Higher Level Stewardship option HR8 (2005-2015). This option had two significant scheme-design related barriers. Awards were discretional, creating a competitive environment for Higher Level Stewardship applications, which undermined trust between neighbouring farmers. And HR8 could only be included in applications under limited circumstances; where agreements covered "areas under more than one ownership that are to be managed for resource protection, inter-tidal flood management and/or wetland management, it may also be used to facilitate applications in landscapes with extensive archaeological or historic features" (Defra 2010). Although the literature shows farmers have concerns over their ability to hold cooperating farmers to account under joint agreement contracts, contract issues have not proved to be a particular problem with Higher Level Stewardship agreements which included HR8 (Franks and Emery 2013, Short and Waldon 2013). Although these applications involved farmers submitting a single joint application Natural England, who administer the scheme on behalf of Defra, each farmer was required to sign-up to an Internal Agreement as part of the joint application which details and clarifies their individual commitments and obligations (Defra 2011).

Limitations

The literature on UK farmers' attitudes towards cross-holding environmental management may not be extensive, but it covers hypothetical and formally financed schemes in diverse landscapes (inter-tidal land, upland moorland, and lowland flood plains). However, relatively few farmers were involved in each study, and all but one focused on small geographical areas. Section 4 presents additional evidence, again taken from the farmers' perspective, of design features which would positively and negatively influence their decision to participate in a cross-holding AES. The on-line consultation, from which this evidence is taken, is described in the next section.

3. On-line Consultation And Descriptive Statistics Of Respondents

The on-line consultation was designed to reveal UK farmers' views towards cross-holding environmental management schemes and options. The consultation set out to target environmentally informed farmers because these respondents are best able to provide the detailed and knowledgeable responses required; (i) to inform decisions on whether changes, in this case to AES, are needed, and to advise on how to make those changes; (ii) to alert policy makers to concerns and issues which they may not have picked up through existing evidence or research; and (iii) potentially, to improve timeliness, so insights can be captured at an earlier stage in policy development: recent research has shown how early insights benefit and improve policy making (Phillipson *et al.* 2012). To achieve this aim, the consultation was publicised on the webpages of three national environmental NGOs; Linking Environment and Farming (LEAF); Game and Wildlife Conservation Trust (GWCT); and Farming Wildlife Advisory Group (FWAG). To access the wider farming population, the consultation was also advertised by the Royal Institute of Dairy Farmers and the Institute of Farm Management. The consultation document was posted on-line on the 23rd July 2011 and withdrawn on the 28th October 2011.

The consultation consisted of 28 questions. Ten solicited characteristics of the farmer, the farmer's family and farm, fourteen were related to aspects of cross-holding scheme design, and four Likert-type questions assessed

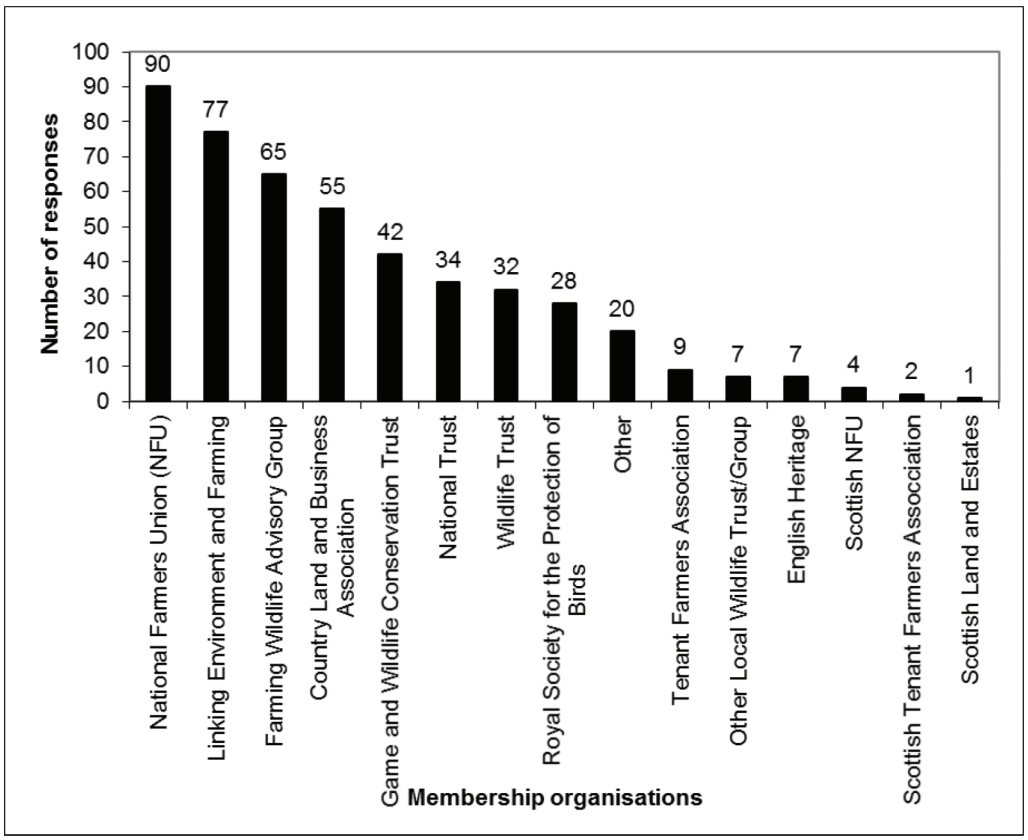

Figure 1: Membership of environmental and other organisations by 122 respondents to on-line consultation (multiple membership is possible)

the degree of independence farmers had over their participation decision. Some questions were preceded by clearly stated background information. The consultation did not specify how such a cross-holding scheme might be designed, because at the time of the consultation there was no indication cross-holding options would be included in future AES, clearly, therefore, details of the Mid Tier joint application opportunity were not available. This approach requires respondents to formulate their own ''model'' of how a joint scheme might be designed, and to present their views and opinions of the practical issues their ''model'' might give rise to. This provided respondents the freedom to reflect on a wider range of possibilities as they were not constrained by pre-formulated rules, thus providing a richer source of ideas and suggestions about the ways in which practical issues related to the design of a joint application scheme might affect their participation decision.

A total of 122 responses were received, 106 from farmers in England (from 36 counties), 11 in Scotland (from 5 counties), 5 in Wales (from 3 counties) and one from Northern Ireland.[4] The majority of the farms were larger than 200 ha (58%), the fewest less than 100 ha (19%). ''Mixed farming'' was the most commonly represented farm type (45%), followed by arable (35%) and livestock (16%), 8% were totally or partly horticultural farms, and 4% dairy farms. The consultation therefore adds to the available evidence by, for the first time, reporting the views of a large number of non-neighbouring farmers, over a wide geographical distribution. This means the responses are more likely to represent a wider range of farming, environmental and business circumstances than those reported in the case-study based literature reviewed in Section 2.

Of the 122 responses received, 77 were members of LEAF, 65 members of Farming and Wildlife Advisory Group (FWAG), and 44 members of Game and Wildlife Conservation Trust (GWCT): 31 (25%) were members of all three organisations (Figure 1). Respondents were currently involved in a total of 223 AES and conservation activities (Figure 2). The underlying proportion of UK farmers who are members of these organisations is considerably lower than these percentages, and it is likely the average UK farmer is involved in fewer environmental schemes.[5] Fourteen respondents were not currently in any formal AES, though three of these had previously participated in Entry Level Stewardship. This shows that the strategy of deliberately targeting farmers who have knowledge of environmental policy and experience of the practical application of environmental schemes and options was successful. However, compared to the underlying population of UK farmers, it can be speculated that respondents' are:

- more likely to have better access to advisory networks than non-members of national conservation NGOs;
- and as such, to have a better understanding of the potential positive environmental spill-over benefits from joined-up, cross-holding environmental management;
- and, arguably, as a result, be more prepared to accept higher levels and new types of risks that may be involved in collective action;
- and, in general, be better disposed towards innovative AES and options, and thus place different weight on

[4] One respondent farmed land in England and Scotland.

[5] At the time of the consultation, GWCT has a membership of about 22,000, FWAG of 8,000, and LEAF 2,500. The average number of environmental agreements the average UK farmer is involved in is not known.

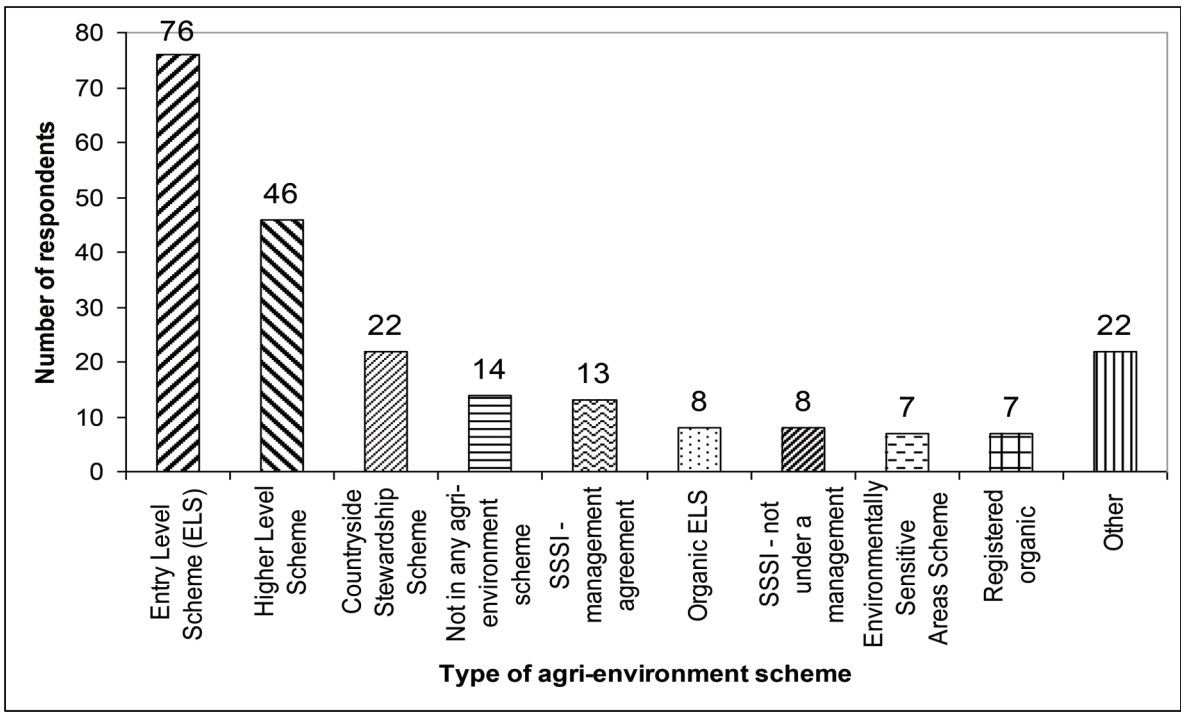

Figure 2: Agri-environment scheme(s) in which respondents (n=122) currently participate

the trade-off between commercial farming and conservation activities.

It is likely therefore that respondents are more favourably disposed towards cross-holding AES than the underlying population of farmers. Nevertheless, the targeting is justified when the intention is to garner views on practical designs, possible unintended consequences and details of the implementation of innovative policy initiatives (Cabinet Office 2012). This approach also lends itself to on-line data collection because there is no need for the responders to a consultation to be drawn from random or stratified random samples. But as a consequence, the research is best described as a consultation rather than a survey. Surveys typically gather views from random or stratified random samples drawn from the population to allow findings to be raised to the population level to provide, for example, estimates of support for a proposal or initiative. Findings from consultations cannot be used in this way. Because of this disadvantage, the views expressed cannot be expected to represent the full range of views of the underlying population of UK farmers towards cross-holding environmental management schemes. As a consequence, the study should be treated as a scoping study, the findings of which need further testing to establish how representative they are of the UK farming population.

4. Findings From The On-line Consultation Exercise

Before answering the question, ''would you cooperate with one or more of your neighbouring farmers in a joint AES? (Assume you are compensated for loss profits and other costs incurred)'' respondents were asked to read the following statement,

Table 2: Initial response to whether respondent would participate in principle in a cross-holdingagri-environment scheme*

Intention to cooperate with one or more neighbour	Responses (%)
I think I would cooperate	91 (74%)
Unsure – maybe	19 (16%)
I don't think I would cooperate	12 (10%)
Total responses	**122**

*In considering their response, respondents were asked to assume the financial payment would cover their ''costs and lost profits''.

This was a closed question, the responses indicate the options presented to respondents.

> ''A principal reason for this survey is to ask for your views towards cooperating with neighbours to manage environmental features at a landscape scale. The area covered by the ''landscape scale'' and the type of coordination required remain unclear, but it might be expected to vary with the existing environmental characteristics of the landscape - so this [i.e. the first question] can only be a general question related to the principle of cross-holding environmental management.''

Ninety-one (75%) responded that they would, in principle, participate in a joint AES, 12 (10%) would not, and 19 (16%) were ''uncertain'' (Table 2). Despite the wealth of experience and practical knowledge of environmental conservation among the respondents, the majority (62%) had never previously considered the issues raised by cross-holding agri-environment management schemes.

Table 3 shows respondents' justification for their answer. Forty-three (35%) of responses to the open question

Table 3: Reasons given by respondents to explain their initial response reported in Table 1 (n=121)

	Responses (%)
Appears to be a sensible idea	43 (33)
Generally unsure (*many in this category stated that ''specific scheme details" - i.e. what is required of my farm - was an important consideration*)	18 (14)
Some problem with their neighbour(s) mean cooperation unlikely	29 (22)
Expressed concerns other than those related to the attitudes of neighbour(s)[†]	17 (12)
Currently considered I do this already	13 (12)
Instant reaction not possible (I have thought about this for a long time already)	7 (5)
No response	1 (1)
Total reasons given	128[*]

[*]Seven respondents gave two reasons.
[†]Most of the respondents expressing concerns, but not all, would not participate in cross-holding schemes.
This was an open question, with no limit to the length of the response; responses were coded by the senior author.

Table 4: Examples of current cross-holding activities

- I am already involved through the Cheshire Wildlife Trust's Gowy Connect project [in Cheshire, England].
- I already cooperate with 2 other neighbours with Higher Level Stewardship public access.
- I am happy to cooperate and we are already doing so in this part of the Cotswolds as we are part of the Higher Level Stewardship farmland bird initiative.
- In the Ant catchment valley (North Walsham, Norfolk, England) we've been doing it for 4 years. Natural England Multiple Objectives project (NEMO) was the reason for going into Higher Level Stewardship.
- We have already agreed to create some permanent pasture for a neighbour to graze and support our Higher Level Stewardship options with his cattle.
- Scheme already in place for co-operation on common land.
- I already cooperate with our local District Council and The Forestry Commission (as neighbours) in the recreation of lowland heath.
- Informally I already do - we are about to make scrapes for wading birds to complement existing scrapes on a neighbour's farm.
- We already do, so happy to continue.
- I have been cooperating for 12 years.
- I already do co-operate with 3 neighbours.
- Novel idea but not daft! Especially as my nearest neighbour is my landlord. Am already doing schemes to mirror his but to collaborate to far might alter the landlord /tenant relationship.
- I am already involved [in] .... a Nature Improvement Area[*] application with 30+ other farmers.

[*]*Nature Improvement Areas were introduced in England in 2012 as a key Natural White Paper commitment. Their primary aim is to develop ecological networks within defined areas. The NIA refereed to here is the only one that was primarily led by farmers.*
These responses were to an open question welcoming respondents to comment on the ''idea of working jointly with your neighbour to manage your farm's natural resources at the landscape level''.

''what was your first reaction to the previous question?'' were coded as 'collaboration is a sensible approach to environmental management', eighteen (14%) were coded as 'generally unsure', many of these referred to the importance of scheme detail to their decision, without detailing what particular aspects of the scheme would be critical to their participation decision. However, twenty-nine (22%) perceived collaboration would run into problems because of the unhelpful attitude of their neighbours. Sixteen respondents cited problems other than those coded above, the commonest of which related to additional bureaucracy (3).

Thirteen respondents (11%) were currently involved in some form of cross-holding agri-environment activity, details of which are presented in Table 4. These cross-holding actions range from 'cooperation for public access' (joining footpaths across different farmers' land for example) to participation in Higher Level Stewardship of Environmental Stewardship Scheme agreements. Presumably these farmers consider this to have a cross-holding element because all Higher Level Stewardship agreements are (i) concentrated in specified target areas, (ii) offer a restricted range of environmental management options, and (iii) prioritise the same environmental targets. Taken together, this means participants must include an almost identical combination of environmental management options, effectively delivering a degree of landscape scale management, despite there being no formal linkages between farmers or with third parties. However, 46 respondents were involved in HLS, so the majority had not interpreted their farm's contribution in this way.

One respondent was involved in either the Higher Level Stewardship's HR8 option or the Upland Entry Level Stewardship's UX1 option, the response did not make clear which. Other farmers were working with the Forestry Commission, the Cheshire Wildlife Trust, or in the Ant Valley water catchment area, Norfolk, England. One respondent was involved in an application for Nature Improvement Area status which was initiated by a group of farmers.

Perceived problems and benefits of cross-holding conservation

All respondents were asked if they envisaged any particular problem working with their neighbours in jointly managed AES. Responses to this open question were coded and are presented in Table 5. Fourteen respondents (13%) believed that any problems that did

Table 5: Responses to question asking participants to identify 'particular problems they would envisage in working together with their neighbour to jointly manage their farm's natural environment' (n=110)

Particular problems arising from cross-holding environmental management.	**Responses (%)**
Problems related to neighbouring farmers	
Neighbouring farms all managed differently or have different systems	19 (18%)
Other farmers wouldn't be keen on the idea	15 (14%)
Requires all farmers involved to be like-minded	5 (5%)
Getting everyone to agree in the first place	4 (4%)
Problems related to the details of any cross-holding agri-environment scheme.	
Legal issues (incl. monitor contributions)	18 (17%)
Economic issues (reduce farm productivity)	12 (11%)
Need to wait and see details of any proposals	8 (7%)
Scheme administration and bureaucracy or paperwork	4 (4%)
Would need to involve landlords on tenanted farms	3 (3%)
Respondents who could foresee no problems.	
No problems whatsoever	14 (13%)
All other responses (including: timing and coordination issues, strong dislike of neighbour, and have sufficiently large farm that can management land on a landscape scale without the need to involve neighbours)	5 (5%)
Total number of problems raised.	**107**

Respondents could identify more than one problem. Twelve respondents did not answer this question.
This was an open question. There was no limit to the length of the response; responses were coded by the senior author.

emerge could be addressed satisfactorily. Only two of these respondents provided details of their point of view. Both reported that their neighbouring farms were managed similarly to their own, and that they already cooperated with them. This confirms the importance of designing schemes that are easy to integrate into existing farming systems (Lobley and Potter 1998, Raymond *et al*. 2016, Siebert *et al*. 2006, Wilson and Hart 2001). The problems raised by the remaining respondents are discussed under two thematic headings: concerns with the views of their neighbouring farmers and the detailed small print (i.e. regulations) attached to any cross-holding AES.

Problems caused by the views of neighbouring farmers

Forty percent of responses anticipated four discrete but different problems involved in working jointly with their neighbour(s); the diversity of farm systems (17%), their belief that neighbours would not support cross-holding schemes (14%), the requirement that farmers needed to be like-minded (5%), and the difficulty of getting sufficient agreement even with like-minded farmers (4%). Problems with neighbours are summarised in the following comments;

> ''I wouldn't have my neighbour on my farm at any price''.
>
> ''The not interested neighbour still wants every acre to grow crops and has removed all his hedges.''
>
> ''Most of my neighbours do not like collaboration or being told what to do with their land.''

When beliefs like these are based on knowledge of neighbours' opinions they form a significant barrier to the development of cross-holding environmental management applications. However, these views assume knowledge of responses to an innovative environmental scheme, which, as the consultation indicates, is an innovation the majority of even generally environmentally-aware farmers have never considered themselves.

Detail of the proposed cross-holding agri-environment scheme

Forty-one percent of respondents thought the principal problem with working together to jointly manage farms' natural environment would depend on the details of any proposed scheme. Eighteen respondents (16%) were particularly concerned about the legal issues, including monitoring individual farmers' contribution to jointly submitted applications. Some of these respondents were concerned they might be penalised for the inactions of others, or that collaborators would renege on their agreement. For example;

> ''I can only see this working as a voluntary scheme. I can't think of many farmers willing to rely on neighbours under an incentivised scheme such as ELS [Entry Level Scheme] for fear of being penalised for their neighbours' non-compliance.''
>
> ''[Cooperating farmers] could pull out on a whim, thus increasing the risks for those remaining''.

As mentioned above, Higher Level Stewardship agreements which included option HR8 required farmers to sign an Internal Agreement, which clearly designates each farmer's responsibilities and obligations.

The issue of an appropriate level of payment was also raised by 12 respondents (11%) even though the question clearly stated payments would cover all costs associated with joining a joint scheme. Any financial compensation offered must comply with the World Trade Organisation's ''green box'' rules (Rodgers 2004). Therefore, compensatory payments are restricted to income foregone plus transaction costs plus any direct costs incurred. Although current payments already allow reimbursement of transaction costs related to organising cross-holding agreements, such as legal and advisory fees, the recent Common Agricultural Policy (CAP) reforms

increased their transaction cost-related element of the payments for applications from farmer-groups by 10% (from 20% to 30% of the value of the AES payment (European Union 2013Article 28, Clause 6, Page L347/512)). However, the reforms did not alter any other rules for calculating agri-environment payments. Consequently, remuneration is not able to take into account any increase in effectiveness of AES resulting from cross-holding, landscape scale environmental management (Wynne-Jones 2013), nor can payments include any form of amalgamation bonus (Parkhurst *et al*. 2002, Parrott and Burningham 2008).

Main benefits from working together to manage the natural environment

Respondents were asked what they believed to be the main benefits from working together to jointly manage the farms' natural environment. Even though the majority had never before considered cross-holding AES prior to responding to this consultation, sixty-seven (63%) believed cross-holding schemes and options would offer additional wildlife and biodiversity benefits compared to field- and farm-scale agreements (Table 6). A typical response was;

> ''Environmental outcomes would surely be far better. Greater opportunity for a properly designed environmental scheme rather than little bits and pieces of habitat creation which aren't necessarily co-ordinated to benefit any relevant species other than the greater-spotted bureaucratic box-ticker which previous schemes have been designed to suit.''

Table 6: The principal benefits to respondents from working with their neighbours in the joint management of their farms' natural environment'' (n=106)

Principle benefits of joint management.	Responses (%)
Benefits to wildlife and biodiversity	67 (63)
No benefits	13 (12)
Financial benefits	11 (10)
Do not know what benefits there may be	2 (2)
Other	13 (12)
Total responses to this question.	106

This was an open question, with no limit to the length of the answer; responses were coded by the senior author.

Eleven respondents (10%) believed there would be financial benefits from working together. One commented,

> ''We were able to get significant grant aid for a large project that individually would not have been possible'' [no additional details were given].

However, thirteen respondents (12%) believed working together would not deliver any environmental benefits, though some respondents took this view because they believed there were already sufficient environmental features in their area. Others, as reported, believed high participation rates in agri-environmental schemes already effectively deliver a cross-holding approach. One respondent believed cross-holding options would add no further benefit because;

> ''I have already put in place most of the potential collective options listed [i.e. those collective options specifically discussed in the consultation]''.

Support for different types of cross-holding agri-environment options

Respondents were asked to select from a list of environmental management options which they would implement on their farm, given they would receive acceptable financial compensation for doing so. All of the options, presented in Table 7, would be more effective if they were implemented on a scale larger than the typical farm. Not all respondents gave answers for each option, possibly because some were not applicable to their circumstances. Table 7 classifies these options as either ''collaborative'' or ''coordination'' using Boulton *et al.*'s (2013) definitions; that is, ''collaboration'' are collective actions which require land managers to ''meet, work together and maintain a dialogue … for a project to deliver the desired outcomes'' (p 4), whereas ''coordination'' allows land managers to work towards the same objectives in isolation from one-another, typically coordinated by a third party. These definitions, which establish that direct working between individual participants is not necessary for the project to deliver its desired outcome (p 4), have also been used by Prager (2015) and Raymond *et al*. (2016). For example, sequential cutting of hay by neighbours is a collaborative option as it requires neighbouring farmers to interact to schedule

Table 7: Respondent's views towards cooperative and collaborative cross-holding environmental management options

	Responses		
Coordinated (farmer-third party) collective action	Yes	No	(%)*
Create continuous networks of hedges/ditches (joined up with your neighbour's hedges/ditches)	107	10	91%
Extend environmental management into areas close to existing high nature value sites (such Site of Special Scientific Interests)	73	15	83%
Create a network of water features e.g. ponds	79	33	71%
Locate trees in designated sites that best suit the landscape (i.e. perhaps not always where you would prefer them)	74	36	67%
Expand woodland you may have on your land	58	36	62%
Allow land to revert to semi-natural habitat	54	56	49%
Collaborative (farmer-farmer) collective action			
Co-ordinate the timing of hay cutting with neighbours	63	24	72%
Create areas of wetland - allowing the water table to rise	40	62	39%

**% of yes to total responses received. Not all respondents answered each question.*

their activities. The option "create a continuous network of hedges/ditches" is a coordinated action as it does not need discussions with neighbours, though it may benefit from assistance of a third party with a knowledge of landscape scale environmental features. Respondents were more supportive of coordinated (farmer-third party) options (Table 6). "Coordinate the location of hedges/ditches so they joined up with neighbours hedges/ditches" was supported by 91% of respondents, a willingness to "extend environmental management into areas close to existing high nature value sites, such as Sites of Special Scientific Interest by 83%, and the creation of "a network of water features, e.g. ponds" on their land by 71%. The strongest support for a collaborative option was "co-ordinate the timing of hay cutting with neighbours", by 72% of farmers.

Rather unexpectedly, given the literature on participation in AES which suggests farmers prefer flexibility in selecting, managing and siting environmental management options (Siebert *et al.* 2006), seventy-four respondents (61%) said they would be prepared to "locate trees in designated sites that best suit the landscape, (i.e. perhaps not always where you [i.e. the respondent] would prefer them)". Among those options to receive the least support was "create areas of wetland – allowing water table to rise" (39%) and "allow land to revert to semi-natural habitat" (49%). Both options have longer term implications for land use, which research suggests farmers consider unfavourably, perhaps because, by taking land out of production, these options go against farmers view of themselves as food-producers (Emery and Franks 2012), perhaps because they reduce flexibility of future farm development plans because they result in longer-lasting change (Siebert *et al.* 2006), or perhaps because many are less easy to reverse (Hodge and Reader 2010). However, these disadvantages also apply to the option "increasing the area of woodland", which was supported by 67% of respondents.

The willingness of a majority of respondents to plant trees and create ponds, hedges and ditches where they would be most effective given the configuration of environmental elements across the landscape is an important finding because the placement of environmental management options, whether collaborative or coordinated by a third party, is essential to the development of an integrated and enhanced ecological network.

The options listed in Table 7 could be delivered through either a whole- farm or a part-farm AES. Part-farm schemes are particularly useful for integrating a large farm into the existing ecological network (Wilson and Hart 2001) and where farmland is highly productive (Franks and Emery 2013).

Pest and invasive species control

A key benefit of connected landscapes is improved species mobility (Natural England 2015a). But this increase in landscape permeability may also benefit species which have undesirable impacts on the environment. For example, non-native invasive species, crop and livestock pests and diseases, and vermin, each of which may impose considerable costs on farm businesses. Before asking respondents to answer the yes/no question, "would you be willing to work with your neighbour in joint AES agreements if in doing so some of the target species/pest species you supported/enhanced included [in turn: foxes; badgers; rabbits; bat; deer; Turtle Doves]?", consultees were presented with the following statement,

> "In addition to helping many rare target species, it may be that landscape scale management also helps species that many farmers might consider to be pests".

Seventy-three percent would not support cross-holding environmental management if it benefited fox populations; 74% would be unsupportive if the changes benefited badger populations, 89% unsupportive if the changes benefited rabbit populations; 58% unsupportive if deer populations were supported. However, 79% and 88% would support collaboration if it helped Turtle Dove and bat populations respectively. Respondents were then asked the yes/no question "would an option for pest management within a cross-holding scheme satisfy any fears you may have over its impact on pest populations?" Seventy-four percent said it would, giving clear support to offering pest management options as an environmental management option within a cross-holding AES. Whilst pest control may be a controversial issue, it is clear that support for cross-holding schemes would fall if they had adverse, albeit unintended, consequences. Pest management options not only largely addressed this concern, but may deliver additional benefits, given that uncoordinated attempts to control the movement of undesirable species can be ineffective, and even counterproductive (Coulson *et al.* 2004).

5. Further Discussions On The Consultation Findings

The findings from the consultation add to the evidence presented in the literature review by reporting the views of a large number of environmentally-informed farmers whose geographical separation suggests they are more likely to be subjected to a wider range of diverse environmental and farming circumstances than respondents in the case study-based studies. They confirm many comments reported in the literature. But raise two particular issues, both of which may affect scheme effectiveness, which are discussed here: awareness of the expected environmental benefits of landscape scale schemes, and the need to offer collaborative and coordinated environmental management options in landscape scale AES, to help allow for uncooperative neighbours.

Prior awareness of landscape scale environmental benefits: framing cross-holding benefits

The consultation findings suggest that a respondent's prior awareness of the potential improvement in environmental effectiveness delivered by cross-holding management options was an important determinant of their participation decision. This supports recent research which emphasises the importance of farmers' perceptions of scheme effectiveness to their participation decision (Mills *et al.* 2013a, Mills *et al.* 2013b). Despite the high proportion of respondents with experience of AES, the majority (62%) had never considered cross-holding environmental management prior to this consultation; it is unlikely a less environmentally aware and committed

Table 8: Types of landscape scale stewardship arrangements (adapted from Boulton et al. (2013) and Uetake (2014))

Governance mechanisms for delivering effective landscape scale environmental management	**Boulton et al.'s (2013) classification of Uetake's typography of collective action**	**Example from UK AES**
Effective landscape scale action without collective action		
Landscape scale achieved by scheme design which requires neighbouring farmers to select similar environmental management option, generating landscape scale impacts if participation achieves critical mass.	No formal or information contact between farmers – see text(Not classified by Boulton et al. (2013))	• Environmental Stewardship Scheme Higher Level Stewardship agreementsHigh Tier of Countryside Stewardship
Typography of collective action (Uetake 2014)		
Type 1: Organisational style collective action in which farmer are members of independent organisation	Farmer-farmercollaboration	• No such organisations in AES the UK* (for example, compare with agri-environment cooperatives, in the Netherlands)
Type 2: Farmer activities coordinated at the landscape scale by specialise third parties working with individual farmers	Farmer-third partycoordinated	• HR8 option in Environmental Stewardship Scheme Higher Level Stewardship agreements *when farmers hand over total managerial responsibilities to the third party* (e.g. specialists land management and grazing trusts). • Capital Grants element of Countryside Stewardship
Type 3: Farmer-farmer meetings and dialogue.	Farmer-farmercollaboration	• HR8 option included in Environmental Stewardship Scheme Higher Level Stewardship agreements *which is manged by the farmers.*
Type 4: Farmer activities coordinated at the landscape scale by specialist ''third parties'' who work with groups of farmers.	A combination of farmer-farmer collaboration and third-party coordination(Not classified by Boulton et al (2013)).	• Mid Tier of Countryside Stewardship involving farmer-group applications, agreed between farmers and coordinated by facilitators see Defra 2015 for details see Defra 2015 for details).

*There are examples of Type 1 organised collective environmental-focused action in the UK which is outside formal AES.

farming population would be any better informed. It appears, therefore, that important policy reviews, such as Lawton *et al.* (2010), and academic studies which report benefits from cross-holding action at the landscape scale (Dutton *et al*. 2008, Ewald *et al*. 2010, Gabriel *et al*. 2010, MacFarlane 1998, Merckx *et al*. 2009, Parrott and Burningham 2008, Southern *et al*. 2011) have not filtered through to farmers.

Social science research confirms that the way stakeholders frame issues and conflicts can help explain the success or failure of initiatives (Gray 2004). This suggests information campaigns which effectively present and explain the scientific evidence of the environmental benefits arising from cross-holding environmental management would increase the number of group applications. Farmers are bombarded by information and instructions, through membership groups, letter shots, demonstration farms and events, so these mechanisms could all be used for this purpose also. But more radical approaches might involve identifying local champions for landscape scale environmental management, or creating a professional farm management qualification as a requirement to receive compensation payments. Such a certification scheme could offer CPD training events which aim to develop a more professional attitude towards environmental management (Lobley *et al*. 2013).

Choice of environmental management options

A key reason for introducing cross-holding schemes is the weight of evidence that AES effectiveness will increase if it is designed at the scale of the targeted species and habitats (Kleijn *et al*. 2011, Tuck *et al*. 2014). Although Kleijn and Sutherland (2003) recommended that ecological evaluation becomes an integral part of all schemes, provision for monitoring of AES effectiveness continues to be criticised (European Court of Auditors 2011). This is because measuring effectiveness is complicated by difficulties identifying the counter factual position (Hanley *et al*. 1999, Hodge 2000), a general lack of pre-stated, specific measurable objectives (Mountford *et al*. 2013), and the need for dedicated environmental impact monitoring (Finn *et al*. 2009). These problems mean monitoring tends to be expensive. Natural England has a £1.8m budget for this purpose, part of which is being used to establish environmental baseline data for 7% of CS whole-farm agreements (based upon Defra's ''Monitoring and Evaluation Plan 2015-2020'' (Chesterton, NE Evidence Programme Manager, *pers com*)).

If these and follow-on studies confirm CS does increase scheme efficiency, it would provide policy makers with the option to rebalance the area of land used to produce environmental and food goods. A more effective CS would allow more environmental goods to be delivered from the same area as the less effective farm- and field-scale AES, or the same amount of environmental goods from a smaller area of farmland, thereby releasing land for food production. As such, CS would provide a practical approach to delivering sustainable intensification, the policy that seeks to increase both agricultural production and ecosystem services from land (Elliott

et al. 2013, Foresight 2010, Franks 2014). Carefully designed assessments may also help identify the landscapes within which cross-holding schemes would be most beneficial.

Table 8 classifies landscape scale management opportunities offered through AES in England based on Uetake's (2014) typology of collective action stewardship and Boulton *et al.*'s (2013) definitions of ''collaboration'' and ''coordination'' (see Section 4). It allows for the view expressed in the consultation that participation in Higher Level Stewardship Scheme can contribute to landscape scale environmental management, despite an absence of collaboration or coordination. This is because Higher Level Stewardship targets farmers farming in a small geographical area, requires them to select from the same, small number of environmental management options, all of which are designed to prioritise the conservation and preservation of the same environment habitats and species. However, in such cases, effectiveness is dependent on the participation of a critical mass of eligible farmers to overcome the ''threshold effect'' (Sutherland *et al*. 2012). This effect refers to the need for a minimum number of participants to trigger perceptible improvements to the state of the natural environment (Dupraz *et al*. 2009). The number of Higher Level Scheme participants which comprise this ''sufficient'' number will depend on the characteristics of each site, as it is likely to vary with; farm and field size and their spatial distributions; the proportion and spatial distribution of high nature value features on collaborators' and non-collaborators' land; the location and condition of existing environmental features; and the number and type of cross-holding options taken-up. It is likely that collaborative and cooperative AES would have a lower critical mass threshold because of the additional environmental benefits from collective action (Benton *et al*. 2002, Chamberlain *et al*. 2000, Tscharntke *et al*. 2005). Three examples of landscape scale management in Table 8 refer to the recently introduced CS; the Higher Tier, Mid Tier and Capital Grant finance. These are discussed in the following section.

6. Farmers' Priorities And Concerns And The Design Of Countryside Stewardship

The evidence presented in the literature review and consultation suggest that the majority of farmers will at least consider participating in a cross-holding scheme (Emery and Franks 2012, Franks and Emery 2013, MacFarlane 1998). Although this study has revealed substantial barriers to converting intentions into actions, research suggests that the level of participation in AEs increases if they are designed taking famers' views into account (Beedell and Rehman 1999, Reed 2008). Table 8 developed Uetake's (2014) and Boulton *et al.*'s (2013) classifications, and argues that CS's Higher Tier, Mid Tier and Capital Grant finance can all contribute towards enhancing environmental management at the landscape scale. This Section introducing these elements of CS, and explores the extent to which the concerns of farmers' revealed in the literature and the on-line survey have been incorporated into their design. It them proposes changes to CS which may increase the number of farmer-group applications in the next round of AES reforms.

Higher Tier Countryside Stewardship

The *Countryside Stewardship Manual* (Natural England 2015b) confirms CS will remain entirely voluntary and be structured around three main elements: Higher Tier; Mid Tier; and Capital Grants. Successful applications to High and Mid Tier will be expected to dedicate a minimum of 5% and 3% of the farm area to relevant management options respectively. Higher Tier is essentially similar to Higher Level Stewardship; it is a whole-farm discretionally scheme, targeted at high nature value regions, which requires farmers to select from a small menu of environmental options. Therefore, if the number of participants exceeds the region's critical mass, it can, in the same way as Higher Level Stewardship, deliver cross-holding environmental impacts.

Mid Tier of Countryside Stewardship

Like Entry Level Stewardship, Mid Tier is a whole-farm scheme which requires farmers to choose from a menu of environmental management options, with each option allocated points. However, it has three key differences. Mid Tier is discretionary, applications are ranked, and the highest ranked are funded, working down the list until the budget is exhausted. Therefore, to be funded an application must score above the ''threshold'' points/ha. Secondly, applications may be presented by groups of at least four farmers with ''adjoining (or mainly adjoining) holdings'' that cover more than 2,000 ha, unless it ''fits a smaller, obvious environmental boundary''.[6] Thirdly, it makes available financial support to facilitate third party advice from a Facilitation Fund of £1.2 million (Defra 2014). Group applications are further incentivised by being given priority in the Mid Tier scoring process (Defra 2014).

The Facilitation Fund meets one of the farmers' key requirements for participation in landscape scale AES, provision of financial support to pay for meetings, advice and completion of paperwork (Natural England 2016). Facilitators can help to overcome farmers' general preference to work independently and help to address the handicap faced by farmers farming in areas which lack existing support networks. The facilitator fee can be up to £12,000/annum over the life-time of the agreement. Mid Tier also addresses farmers' concerns about the legal status of farmer-farmer contracts by requiring each farmer in a farmer-group to sign an individual contract with Natural England. However, there is no provision for up-front financial payments to cover meeting and arrangement costs (Franks and Emery 2013), a facility available to farmers under Higher Level Stewardship.

The consultation revealed that 11% of farmers' were concerned about the value of financial compensation offered for joint applications. Current compensation payments are not allowed to reflect a farmer's individual, or collective contribution to the delivery of environmental goods (Rollett *et al*. 2008). However, Mid Tier does incentivise joint applications in their ranking for funding, and additional incentives could be offered if joint applications do improve AES effectiveness. A precedent for this has been set by the derogation offered to registered organic farmers on the area of land they need to enter into ''greening'' to receive their full

[6] This refers to the total area of the holdings, not to the size of the area under joint environmental management.

support payments. This derogation was granted on the basis that organic farming systems provide more environmental benefits than "conventional" farms; this is precisely the goal of farmer-group applications.[7] A resource- rather than payment-based incentive would be especially attractive to those farmers who are not willing to enter productive land into AES (Siebert *et al.* 2006).

Farmers in existing Environmental Stewardship Scheme agreements are not able to apply to CS Mid Tier until their existing contract expires. As the Environmental Stewardship Scheme agreement may have started at any time between 2005 and 2014, it is unlikely that the existing contracts of at least 4 neighbouring farmers, of suitably size, will expire at the same time. Therefore, the precedence set by the Upland Entry Stewardship – which allowed farmers to switch from their existing Entry Level Stewardship to the newly introduced Upland Entry Level Stewardship as soon as it opened - should be extended to farmer-groups as soon as their joint application to Mid Tier is accepted.

Another problem is that Mid Tier is a competitive scheme, which may restrict farmers willingness to share details and thus reduce the size and number of joint applications (Franks and Emery 2013). There is also an assumption that there are sufficient suitably qualified advisors to satisfy the demand for this service.

Capital Grants of Countryside Stewardship

Capital Grants provide finance to improve hedgerows and boundaries, water quality, and for the development of "implementation plans, feasibility studies, woodland creation (establishment), woodland improvement and tree health" (Natural England 2015b: p 3). A maximum of £5,000/holding is available for improvements to "hedgerows and boundaries", and up to £10,000 for "water quality grants".[8]As these funds are available through the High or Mid Tier, or as stand-alone agreements, they can therefore be used in whole- and part-farm schemes. As a part-farm, standalone agreement it may attract farmers who would like to contribute to environmental management, but who cannot financially justify entering 3% or 5% of their farmland into the whole-farm Tier. However, only eleven of CS's 114 approved capital items can be selected in standalone applications. Nor can Capital Grants be used to extend a buffer zone around a Site of Special Scientific Interest, and water quality improvement grants are restricted to farms in Catchment Sensitive Farming priority catchments. Additionally, all woodland creation grants are reserved for Higher Tier agreements (Natural England 2015b: p 4-6). The lack of options available for part-farm, standalone agreements will reduce participation rates. Relaxing this constraint may allow Capital Grant finance to make a more valuable contribution to integrating existing environmental features into the ecological network.

A further consideration: budgetary constraints

Can collective action lead to more effective AES without increasing budgetary expenditures? The agri-environment budget for England between 2015 and 2020 is in excess of £2 billion. Existing Environmental Stewardship Scheme contacts will continue to be paid, leaving a total CS budget for 2015-2020 of £925m. Of this, £380m is earmarked for the Higher Tier, £410m for Mid Tier and £85m for Capital Grants (Dixon 2015). Therefore, an increase in the budget for one element of CS reduces funding on another. One way to raise effectiveness within these budgetary constraints is to target each element of CS where they can be most effective (Sutherland *et al.* 2012). For example, Capital Grants could be targeted at landscapes where in-filling existing landscape habitats creates or significantly improves the existing, ecological network (see, for example, Donald and Evans 2006, McKenzie *et al.* 2013).

Alternatively, the budg*et al*lowances for each tier could be made more flexible. All CS awards are discretionary, so only the highest ranked applications are funded. This may mean an application to Higher Tier is rejected even though it benefits the ecological network more than the lowest ranked funded Capital Grant application, or vice-versa. Such flexibility in the budg*et al*located to each element of CS might therefore increase its effectiveness.

The financial compensation rules applied to AES do not apply to payments made by the beneficiaries of the environmental management, which is the principle underpinning Payments for Ecosystem Services (PES) (Reed *et al.* 2014).[9] Many existing PES schemes involve water related projects which typically require the cross-holding collective action (GEF 2010). Because PES compensation payments are not regulated by the EU Commission, PES schemes can offer farmers larger compensation payments. For example, they are able to off the "joint application payment" suggested by Parrot and Burningham (2008), or the "amalgamation bonus" considered by Parkhurst and Shogren (2007). These payments could also be scaled according to the number of participants or the total area enrolled in the collective action (Goldman *et al.* 2007), which Kuhfuss *et al.* (2016) show, under certain scheme designs, can have the additional benefit of increasing farmer participation.

7. Conclusions

An important finding from the literature review and the consultation was the interest shown by farmers in cross-holding environmental management, even when it has not previously been considered (Dutton *et al.* 2008, Emery and Franks 2012, Franks and Emery 2013, MacFarlane 1998). This should be encouraging to UK policy makers, as without this initial interest cross-holding schemes could not succeed. Moreover, the majority of respondents to the consultation were prepared to relinquish control over the selection and location of AES options if they believed this would deliver additional environmental benefits. If these responses are representative of the UK farming population, this should also encourage policy makers, because locating specific environmental management options in their optimum locations from a landscape rather than from a field or farm perspective is an essential requirement for creating and enhancing ecological networks.

The literature review suggests the principal barriers to cross-holding schemes are: the preference of many

[7] "Greening" requirements link farmer's entitlement to the full Basic Payment Scheme on their compliance with land use measures on at least 5% of their arable farmland (derogations apply to small sized farms).

[8] The scheme also provides non-competitive support for organic conversion and management, for which all eligible applications will be funded.

[9] PES refers to new business models where private businesses rather than government pays for the production of ecosystem services.

farmers to work independently (Davies *et al*. 2004, Emery 2015, Emery and Franks 2012), which is further exacerbated in areas without pre-existing support networks; specific financial issues raised by collective contracts, and the structural design of cross-holding schemes, including the validity of farmer-farmer contracts. There is also ample evidence that success of cross-holding schemes require provision of third party support to help farmers establish networks and to assist with scheme paperwork. In addition, the consultation showed support was linked to farmer's prior awareness of the additional environmental benefits of landscape scale schemes, and the need for schemes to offer a combination of "collaborative" and "coordinated" environmental management options. Although respondents to the consultation were concerned that successfully designed landscape scale schemes might support unwanted as well as target species, most believed this could be addressed by including suitable pest management control options within AES.

The analysis shows that each element of Countryside Stewardship has the potential to contribute to enhancing ecological networks. Higher Tier may achieve this if it is supported by a critical mass of farmer participants. Mid Tier offers incentives to farmer-groups to submit joint applications. It finances third-party assistance through its Facilitation Fund, as requested by many farmers (Davies *et al*. 2004, Dutton *et al*. 2008, Emery and Franks 2012, Franks and Emery 2013, Mills *et al*. 2011, Southern *et al*. 2011). It also requires farmer-groups to agree individual contracts with Natural England rather than with one another, thus addressing concerns over contractual issues (Emery and Franks 2012, Mills *et al*. 2011). However, it is discretionary, does not provide up-front finance, requires at least 4 farmers, farming over 2,000 ha for each joint application, and does not allow neighbouring farmers to end their Environmental Stewardship Scheme agreements early to synchronise submission of joint applications. In addition, it is a whole-farm tier. When used in stand-alone agreements, Capital Grants scheme can be used to integrate parts of farms of farmers who do not wish to participate in the Higher or Mid Tier, into the ecological network. Therefore, although CS represents a significant move towards managing the environment at a landscape scale, it has not addressed all farmers' concerns.

Incentivising farmers to change their traditional ways of working is key to attracting high participation (Davies *et al*. 2004, Emery and Franks 2012, Franks and Emery 2013, MacFarlane 1998, Siebert *et al*. 2006). Though compensation payments are constrained by the EU Commission's rules, which themselves are based on World Trade Organisation agreements, there is precedence to offer additional resource-based incentives, such as reducing the area of land farmers in farmer-groups have to place in "greening", if additional environmental benefits do result from group applications. If monitoring studies are able to confirm these environmental benefits, then cross-holding environmental management could become a mechanism for simultaneously delivering increases in environmental and food goods from land.

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