

Can upland agri-environment schemes in England support Curlew recovery? A review of current scheme options with farmer perspectives

Noyes, P., Winn, V., Jarrett, D. & Wilson, M.



“It’s nice to walk around after lambing time, you finish and hear the Curlews warbling away on the night, but it would be very quiet without them. But you get used to it after a while, I suppose ... of not having them there ...” Interview participant, December 2024.

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Executive summary

Background

1. The UK's internationally important Curlew *Numenius arquata* population declined by half between 1995 and 2023, this decline has been primarily driven by long-term loss of breeding habitat, increased predation rates, and agricultural intensification since the mid 20th century.
2. Curlew population recovery is dependent upon effective conservation interventions addressing these causes of decline, deployed at sufficient scale. The establishment of effective agri-environment scheme (AES) measures is integral to achieving this, and is central to the UK Curlew Species Action Plan. The development of a new AES system, Environmental Land Management (ELM), with three tiers: Sustainable Farming Incentive (SFI, paused March 2025, planned for return June 2026), Countryside Stewardship Higher Tier, and Landscape Recovery, presents an opportunity to establish such a framework for effective Curlew conservation in England.
3. This report assesses the extent to which the draft measures under ELM will deliver such a framework. We address key knowledge gaps: 1) the extent to which key interventions can deliver Curlew breeding requirements under existing ELM structure, 2) the extent to which farmers in a breeding Curlew stronghold (the Yorkshire Dales, UK) would be willing to engage with key interventions, and 3) the level of compensation that may be required for key interventions.

Methods

4. To address these key knowledge gaps, we reviewed ELM actions under SFI and Countryside Stewardship Higher Tier (CSHT) to assess their delivery of Curlew breeding requirements.
5. We also conducted 11 two-hour interviews with 18 participants (farmers engaged with a wader project and AES, primarily based in Wensleydale, Yorkshire Dales, a land use mosaic primarily composed of upland farmland and grouse moor) to explore relevant farm management, motivations and barriers for wader AES engagement, and the feasibility and costs of existing and potential ELM management interventions.

Results

6. No SFI nor CSHT options provided effective provision for lethal and non-lethal predator management, nor targeted nest-protection interventions adjusting farm operations and livestock management in fields where these factors present a threat to wader eggs and chicks. Furthermore, SFI and CSHT were structurally unable to financially support local facilitators, predator managers, field ecologists, or multi-holding agreements, limiting their ability to support such predator management or nest-protection interventions at required scales.
7. Participants reported that local management of permanent pasture (fields and unenclosed ground not cut for winter livestock fodder) supported Curlew breeding requirements. They reported that existing Countryside Stewardship options (e.g. UP2) improved the financial viability of such upland permanent pasture but did not foster novel management. However, participants (and the ELM review) identified that these options will likely be out-competed by new, higher-paying SFI options with little benefit for breeding waders (e.g. CLIG3).
8. Furthermore, participants reported frustrations with existing wader AES, due to a perceived lack of focus on novel, species-orientated outcomes, with one participant describing existing AES as “*a payment for just farming as I am farming it now*”. Seven participants had participated in Results-Based Agri-environment Payment Scheme (RBAPS) trials, reporting that performance-based approaches aligned better with farming mindsets.
9. Most participants reported predation as the key remaining barrier for Curlew breeding success on their farms, and wider farmland in the Yorkshire Dales, and supported the inclusion of lethal and non-lethal predator management options in ELM. Most participants indicated they were content to work with local estates or independent predator managers to deliver lethal predator control.

10. Participants reported high stocking densities in silage and hay meadow during the lambing period March–May (c. fivefold higher than average densities) may limit Curlew breeding success. They estimated excluding livestock in April–May on lambing fields might reduce farm income by c. £2,400 per ha per year, though if nests could be found, temporary livestock and farm operation exclusion around nests would minimally affect farm income.
11. Participants also reported mowing, chain harrowing, and rolling farm operations on silage and hay meadow may limit Curlew breeding success. They estimated that delaying silage cuts to avoid negatively impacting on nests might typically reduce farm income by c. £1,500 per ha per year (or c. £90 per nest protected, if leaving only 25 m by 25 m (0.06 ha) uncut), but preventing chain harrowing and rolling in April–July would minimally impact farm income.

Conclusions and recommendations

12. In its current form, ELM is unlikely to deliver substantial benefits for breeding Curlews. The types of farms most likely to engage with wader AES would support changes to ELM aimed at increasing the benefits it delivers for Curlew.
13. We recommend the following to improve the effectiveness of ELM for Curlew recovery in upland landscapes like the Yorkshire Dales:
 - **Short term:** scale up access to CSHT and review the accessibility and payment rates for CSHT wader actions that create and maintain favourable habitat conditions for waders on upland pasture (e.g. CUP2). These should be supported by actions in SFI which support creation and maintenance of this habitat. Such wader actions must be widely accessible and financially competitive with alternative actions which have limited benefits for breeding waders (e.g. CLIG3).
 - **Medium term:** add ELM scheme design features to allow support for local facilitators, predator managers, field ecologists, and multi-holding agreements, which are needed to ensure public-funded predator management and nest-protection interventions are cost effective.
 - **Longer term:** development of a novel suite of Higher Tier ELM actions (SFI does not provide the mechanisms required) that include evidence-led lethal and non-lethal predator management (effectively targeted and implemented at sufficient scale), and targeted nest-protection interventions, with the flexibility for local facilitators to coordinate and support predator managers, field ecologists, and relevant farm management across multiple holdings. Consider the use of hybrid payment models to support this, which combine action-based and results-based payments.

1. Introduction

1.1. Curlew declines

UK breeding Curlew *Numenius arquata* and other wader populations have shown significant long-term declines across the second half of the 20th century to present day (Balmer *et al.* 2013, Heywood *et al.* 2025), with similar declines evident elsewhere across western Europe (Pearce-Higgins *et al.* 2017). Curlew is on the UK Birds of Conservation Concern Red List (Stanbury *et al.* 2021), and the UK population is internationally important, constituting approximately one-quarter of the global breeding population, itself categorised as Near Threatened (Brown *et al.* 2015). Conservation of species such as Curlew contributes to meeting the Environment Act 2021 target to reduce species extinction risk to below its 2022 level by 2042 (The National Archives 2025). Furthermore, the Curlew is a well-loved species amongst many rural communities, and continued declines and extirpation would represent significant societal loss (Goodall *et al.* 2023).

Curlew declines have been driven by low nest and chick survival (Cook *et al.* 2021, Viana *et al.* 2023) caused by a complex and poorly understood interplay between increased intensities of habitat loss and degradation, predation, agricultural operations, and livestock management (Vickery *et al.* 2001, Franks *et al.* 2017). In response to rising global food demand, agricultural policy, and technological

advancements, UK and western European agriculture greatly intensified in the second half of the 20th century, significantly impacting rural communities and various aspects of biodiversity (Donald *et al.* 2001, Levers *et al.* 2016, Rasmussen *et al.* 2018). Modern agricultural landscapes in the UK can limit the breeding productivity of Curlew and other wader species, both through direct destruction of eggs and chicks (e.g. by farm machinery or livestock) and indirectly via effects on vegetation structure, food resources, and predation pressure (Vickery *et al.* 2001). Predation is now the main proximate cause of Curlew nest and chick mortality (MacDonald & Bolton 2008, Roodbergen *et al.* 2012, Mason *et al.* 2018) and in the UK generalist predators have increased in abundance, and occur at higher densities than elsewhere in Europe (Roos *et al.* 2018). However, the causes of high generalist predator abundance in the UK are poorly understood, prompting Natural England to identify “*research to understand the drivers of high densities of generalist predators and how these can be addressed at a landscape scale to reduce mesopredator densities in the countryside*” as one of three key specific actions required to progress Curlew recovery in the Threatened Species Recovery Actions baseline, to support delivery against the Environment Act species extinction risk target (Wilkins *et al.* 2025).

1.2. Curlew conservation on farmland

In the absence of societal solutions that address the underlying causes of agricultural intensification and generalist predator abundance, Curlew conservation action across the UK and Europe has depended upon interventions aimed at mitigating these factors, such as exclusionary fencing (Smith *et al.* 2011, Malpas *et al.* 2013, Gautschi *et al.* 2024), lethal predator control (Fletcher *et al.* 2010, Laidlaw *et al.* 2021, Baines *et al.* 2023), collaboration with farmers regarding agricultural operations and livestock management (Runhaar & Polman 2018), and diversionary feeding of egg and chick predators (Gautschi *et al.* 2024). Whilst such interventions have generally been successful in increasing survival of eggs to hatching, they have rarely sufficiently increased chick survival to fledging (Macgregor *et al.* unpublished manuscript). Nest-focused actions (e.g. nest-fencing and avoiding farm operations and high stocking densities around nests) tend to be more straightforward to implement than interventions aimed at improving chick survival (e.g. lethal predator control and avoiding farm operations near active broods), due to the mobility of Curlew broods (Bowgen *et al.* 2022, Bowgen *et al.* 2025), and lack of long-term funding to support payments to land managers and/or specialist knowledge and skills (Wilson *et al.* 2020).

Land managers conducting lethal predator control for wader conservation outside grouse moors have rarely, if ever, replicated the methods, intensity, or outcomes of lethal predator control carried out by upland sporting estates, which has been shown to benefit breeding wader populations (Fletcher *et al.* 2010, Baines *et al.* 2023, Douglas *et al.* 2023, Baines 2025). One characteristic of predator control on grouse moors that distinguishes it from most lowland wader projects is that it is conducted by highly experienced, full-time gamekeepers, who are very familiar with the areas they operate in, with much of the targeted area under one landownership. This enables intensive predator control to be conducted at scale (e.g. over areas of 6,000 ha or more per full-time equivalent keeper) using a highly effective combination of methods. This includes shooting and snaring Foxes *Vulpes vulpes*; actively locating and flushing Foxes from dens using dogs; and operating a variety of traps for corvids (primarily, but not exclusively, Carrion Crow *Corvus corone*) and small mustelids (Fletcher *et al.* 2010). Furthermore, this management is driven by a financial incentive to generate a shootable surplus of Red Grouse *Lagopus scotica*.

In contrast to the upland landscapes, where grouse shooting is carried out, many wader conservation projects operate in predominantly agricultural landscapes which can support high levels of meso-predators due to an abundance of food resources. These may include direct anthropogenic subsidies from agricultural activities, roadkill, unsanitary waste disposal, as well as high densities of prey species (Prugh *et al.* 2009, Roos *et al.* 2018). Furthermore, wader conservation projects outside grouse moors have typically employed a more restricted selection of methods, carried out by contractors, at lower intensities and over smaller spatial scales (Douglas *et al.* 2023, Macgregor *et al.* unpublished manuscript). Moreover, this management tends to be driven solely by conservation aims, without commercial financial incentive. Due to these differences, such management has rarely resulted in increases in the productivity or abundance of breeding Curlew populations (Douglas *et al.* 2023, Macgregor *et al.* unpublished manuscript). Beyond predator management, the other key aspect

conservation on the ground has struggled with is managing economically valuable aspects of farm operations and livestock management. Few wader conservation projects have established long-term systems of compensating farmers to facilitate long-term or costly management changes, mostly due to project funding availability and longevity, and the complexity of managing such schemes.

1.3. Agri-environment schemes and Curlew

It is widely recognised that agri-environment schemes (AES) offer the most important potential source of funding to mitigate generalist predator abundance and intensive agriculture for the benefit of Curlew and wider biodiversity (Thompson *et al.* 2026). However, whilst previous AES have helped to slow wader declines to some extent, they have not been able to halt or reverse these entirely (Smart *et al.* 2014, Franks *et al.* 2018, Heywood *et al.* 2025). The nest-focused interventions that Curlew projects have conducted largely outside AES funding, supported by dedicated predator management regimes and payments to farmers to incentivise long-term management to increase chick survival, could form the basis of novel, effective AES measures for Curlew, as well as other ground-nesting birds (Wilkins *et al.* 2025, Thompson *et al.* 2026). Natural England recognised this in another of their three specific actions for Curlew recovery, calling for the “*delivery of a package of evidence-based measures (supported by advice) at a sufficient scale in the most important landscapes for Curlew recovery, to provide optimum nesting and foraging habitat, protection of nests from farming and other potentially negative operations and targeted predator management plans*” (Wilkins *et al.* 2025).

The transition to Environmental Land Management (ELM) schemes provides an opportunity to develop and embed long-term, targeted support for Curlew and other farmland ground-nesting birds in AES. ELM is split into three schemes: the Sustainable Farming Incentive (SFI) focuses on everyday sustainable farming practices, Countryside Stewardship Higher Tier (CSHT) targets specific, more complex land-based actions and habitats, and Landscape Recovery (LR) supports large-scale, bespoke environmental projects (Defra 2020). Whilst LR may be valuable for a small proportion of English Curlew populations, the Curlew’s remaining widespread distribution means the SFI and CSHT schemes must deliver beneficial management if UK Curlew populations are to meaningfully recover. However, key knowledge gaps have hampered policymakers in SFI and CSHT design regarding the extent to which current actions can or cannot deliver Curlew breeding requirements, and the cost-effectiveness of potential interventions included (both in terms of the payment rates required to fund key interventions, and their expected impact on Curlew breeding abundance and success).

1.4. Study background and aims

In January 2022, the British Trust for Ornithology (BTO) and Yorkshire Dales National Park Authority (YDNPA) invited landowners and managers representing 11 farms in the Yorkshire Dales to participate in a research project. This project aimed to inform the development of ELM actions which support wader conservation, and was funded through Defra’s Farming in Protected Landscapes programme (Defra 2025). Most participating farms were located in Wensleydale, UK, with three others near the villages of Clapham, Settle, and Skipton in the south of the Yorkshire Dales National Park. During the project, key farm representatives attended four online and in-person meetings to discuss results and Curlew conservation on farmland in general. These discussions also covered potential solutions for key issues limiting wader breeding success.

In advance of the fourth and final meeting, based on farmer perspectives recorded in the previous three meetings, BTO staff developed a potential ‘model’ for Curlew conservation which outlined how different stakeholder groups (farmers, predator managers, field ecologists, and a local facilitator) could collaborate to conduct interventions which mitigate the key threats farmers and BTO staff identified in the three main field-use types in the Yorkshire Dales (Figure 1). These three main field types were pasture (fields solely used for grazing livestock, where grass is never mown and harvested for winter livestock feed), silage (fields mown and harvested for the production of silage, which tend to be cut earlier and more frequently than hay), and hay meadow (fields mown and harvested for the production of hay, which tend to be cut later and less frequently than silage). This model was also based on the precedent set by multiple local wader conservation projects around the UK (Wilson *et al.* 2020).

Wensleydale is comprised of a land use mosaic primarily composed of upland farmland and grouse moor. During the final meeting, farm representatives, and BTO and YDNPA staff discussed this model and farm representatives were broadly supportive of it, provided management which impacts farm income was compensated.

Following on from these group discussions, in this study we aimed to:

1. review SFI and CSHT ELM actions to assess to what extent they already support Curlew breeding requirements on farmland (farmers and National Park staff indicated this was either unknown or poorly documented) to provide evidence of notable gaps or potential issues with regards to AES supporting species conservation targets,
2. record the perspectives of farmers from the 11 farms involved in the study on the topics raised in greater detail to provide evidence on the feasibility and associated costs of potential upland wader AES interventions and the model of Curlew conservation developed by the BTO based on discussion with farmers (Figure 1).

Figure 1. Handout provided to participants during the interview, preceding the questions related to the proposed partnership model of Curlew conservation (photo: Paul Noyes / BTO, artwork: Aditi Rajan / BTO).

Management of Curlew-nesting field by key Yorkshire Dales field uses			Management by stakeholder	
In fields with known nesting Curlew activity (but monitored to check continued activity)		(P) Pasture • Limit stocking densities April–June in fields in agreements (<1 sheep plus lambs or 0.2 cows per acre) • Chick habitat: ideally heterogeneous sward and 'bumpy' ground. Areas of taller vegetation and damp areas, wet flushes or small, shallow pools.		1. Farmers
		(H) Hay Meadow • Limit stocking densities April–June in fields in agreements • Avoid slurry/muck application April–July • Brood checks in fields before cutting • Chick habitat: largely achieved with hay vegetation if not too dense. Ideally, damp areas, wet flushes or small, shallow pools.		2. Local Facilitator
		(S) Silage • Nest-searching throughout April and May • Limit stocking densities April and May in nesting fields in agreements • Avoid slurry/muck application April–July • Leave c. 0.5–1 ha around known nests or broods when cutting. • Chick habitat: neighbouring uncut fields. If not, some margins or areas left uncut for chick cover, or some permanent non-silage habitat. Ideally, damp areas, wet flushes or small, shallow pools.		3. Fieldworkers
				4. Predator Controller
				• Lethal and non-lethal predator control

2. Methods

We evaluated the effectiveness and feasibility of existing and potential ELM Curlew interventions in the Yorkshire Dales, and more widely, using two complementary approaches:

1. A review of ELM actions against established Curlew breeding requirements (Section 2.1).
2. Semi-structured interviews with farmers to understand farmer perspectives, their willingness to adopt interventions, associated costs, and their views on the BTO-developed model of Curlew conservation (Figure 1, Section 2.2).

2.1. ELM review

We qualitatively assessed the extent to which two ELM schemes: the SFI (SFI 2024, paused March 2025, planned for return June 2026) and CSHT (CSHT 2025), provided management conditions for Curlew breeding success at the time of review. We identified four key factors determining Curlew breeding success, key requirements for these factors, and common management interventions to achieve these requirements, based upon published evidence (Table 1).

For the ELM review, we matched relevant options within SFI 2024 and CSHT 2025 with Curlew breeding requirements and assessed the extent to which specific actions provide necessary management prescriptions. We found action prescriptions on the government funding search engine for SFI (Defra and Rural Payments Agency 2025), published guidance for upcoming CSHT (Defra and Rural Payments Agency 2024), and the search engine for capital grants (Rural Payments Agency and Natural England 2025). Based upon our qualitative assessment, we provided each scheme with a categorical score for each of the four key factors: Green (effective provision), Yellow (some provision), Amber (limited provision), and Red (no provision). We considered interactions with other scheme incentives that might influence uptake, e.g. where more financially attractive options might outcompete those best-suited to Curlew on the same land. We also considered scheme structure, in its ability to deliver key interventions in practice.

2.2. Farmer interviews

During December 2024, we conducted 11 two-hour semi-structured interviews with 18 individuals representing the 11 farms included in the study (hereafter referred to as ‘participants’). We aimed to record participants’ perspectives on existing and potential AES Curlew management, costs to farm income associated with these options, and specifically on the potential model of Curlew conservation on farmland in the Yorkshire Dales (Figure 1). All 11 interviews took place 9–13 December 2024. Interview duration was on average two hours and nine minutes (SD $\pm$ 19 minutes), ranging from one hour and 50 minutes to two hours and 52 minutes. For four interviews, one representative of the farm was present, and for seven interviews, two representatives of the farm were present. Each farm received a fixed fee of £100 for participation, irrespective of the number of participants present. However, other questions were asked during the interviews to follow up when answers raised novel, relevant topics, especially when investigating the impact of potential Curlew interventions on farm income. The set questions broadly covered:

- age and occupation of participants and information about the farms they worked on;

and their views on:

- relevant farm management and local land use,
- wader-relevant AES with which they had previously engaged,
- the model of Curlew conservation that ELM could support (Figure 1),
- key targeted Curlew interventions that ELM could support,
- any costs to farm income associated with these interventions.

A handout (Figure 1) was given to participants during the interview, prior to the questions on the potential model of Curlew conservation, which the interviewer explained in detail, answering any participant questions. However, all participants attended the workshops where this model was introduced and further developed, so were broadly familiar with it prior to the interviews. During the interviews, we asked participants to estimate the cost to farm income of specific interventions to protect Curlew nests and broods. These were: delaying grass cropping; avoiding manure, slurry, and fertiliser applications, harrowing and rolling; and excluding livestock. We asked participants to calculate the costs of these scenarios in the manner that was most intuitive to them. The interviewer then guided the participant towards producing a final estimation of total cost per ha (or whichever unit of area was most intuitive to the participant, which we later converted to ha), unless they had already done so. We asked participants to estimate costs per ha to help inform and refine future AES options, due to variation in field size and the potential spatial focus of interventions. Most commonly, participants imagined the scenario (e.g. you cannot stock or conduct agricultural operations in a silage field where Curlews are known to nest April–July) and considered what management decisions they would need to take to achieve this, and what costs this would incur.

We recorded all interviews and transcribed verbatim with permission from participants to use their answers in subsequent analysis and reporting. We qualitatively analysed transcripts using template thematic analysis coding (Brooks *et al.* 2004), developing hierarchical codes based on pre-determined themes relevant to the research topic, and developing and augmenting these during the analysis. We used these codes to compare responses from different interviews and to identify common themes, particularly where these related to incentives and barriers to wader-sympathetic land management, conservation interventions, and participation in or effectiveness of AES.

Table 1. Key factors determining Curlew breeding success, key requirements within each factor, and key potential management interventions which can help achieve these requirements (and have the potential to be included in ELM options, under current or revised structure). This table was compiled by the authors based on our knowledge of Curlew breeding ecology; whilst it is unlikely to be exhaustive, it likely covers key factors, requirements, and interventions.

Factor	Key outcomes and requirements	Key potential management interventions (where cost-effective)
Nest site availability	Key outcome = sufficient nesting attempts to sustain the population. Curlews nest in a range of open or semi-wooded habitats (grassland, dwarf-shrub, bare earth, wood pasture, and parkland); ideally heterogeneity of sward height (predominantly 10–40 cm) or bare ground, and wet ground or shallow water, more than 0.5–1 km from woodland (Valkama <i>et al.</i> 1998, Douglas <i>et al.</i> 2014, McGrory <i>et al.</i> 2024, Rivers <i>et al.</i> 2024).	Sufficient grazing, cutting, or burning of vegetation to achieve undisturbed (e.g. livestock and farm operations), open vegetation (e.g. grass, rush, or dwarf shrub heath). Restrictions on tree-planting or natural succession on wader breeding sites.
Predation	Key outcome = c. 50% of nesting attempts produce ≥one fledged chick. (Cook <i>et al.</i> 2021, Viana <i>et al.</i> 2023). Breeding success is determined by: • risk levels of predators, livestock, and farm operations disturbing breeding adults or broods, or directly destroying eggs or chicks, • availability of surface invertebrate prey for chicks to forage.	Lethal predator control (Fletcher <i>et al.</i> 2010, Baines 2025). Nest-fencing (predator-proof) (Smith <i>et al.</i> 2011, Malpas <i>et al.</i> 2013). Managing habitat to reduce predation risk (Laidlaw <i>et al.</i> 2020).
Livestock and farm operations		Temporary nest-fencing (stock-proof). Adjusting livestock management (Berg 1992, Grant <i>et al.</i> 1999); agricultural operations (grass cropping, rolling, chain harrowing, and applications of manure or artificial fertiliser (Berg 1992)).
Chick food availability		Manage land for key soil characteristics and wetness (Berg 1993, Silva-Monteiro <i>et al.</i> 2022), applications of manure or artificial fertiliser (Mahesh & Kumar 2017), and vegetation (Silva-Monteiro <i>et al.</i> 2022) to promote surface invertebrate abundance and diversity.

Results

3.1. ELM review

In this section (3.1) we present an overview of our assessment of ELM's provision of Curlew breeding requirements (3.1.1), then provide more in-depth summaries by the key factors we identified: nest site availability (3.1.2), predation (3.1.3), livestock and farm operations (3.1.4), and chick food availability (3.1.5). Table 6 in Appendix 2 outlines the code, name, and grant type of all AES options mentioned in this section.

3.1.1. Overview

Though both SFI and CSHT provided funding for management relevant to Curlew conservation, the availability of relevant and effective actions was very limited (Table 2). CSHT scored marginally higher than SFI on the quality of resources its actions could deliver and payment rates, particularly on nest site availability and chick food provision, but neither scheme is designed to adequately address impacts of predation. Schemes provide very few actions relevant for management of unenclosed farmland above the moorland line.

In terms of interactions with other schemes, we identified high payment rates for SFI actions *CSAM3: Herbal leys* and *CGS26: Manage grassland with very low inputs* as having the potential to compete, and reduce participation, with key CSHT actions providing suitable conditions for breeding Curlew.

Table 2. Overall provision of requirements within each key factor for Curlew breeding success.

Factor	SFI	CSHT	Details
Nest site availability	● Amber	● Yellow	SFI actions are vague and uncompetitive (e.g. <i>GRH1: Manage rough grazing for birds</i> £121 per ha); CSHT higher payments (£500–£650 per ha), better prescriptions; upland eligibility limited.
Predation	● Red	● Red	CSHT supports fencing (<i>FG7: Anti-predator combination fencing</i> , <i>FG8: Anti-predator temporary electric fencing</i>) as capital only; no lethal control in either scheme.
Livestock and farm operations	● Amber	● Amber	Limited grazing control; SFI <i>UPL3: Limited livestock grazing on moorland & shepherding</i> do not provide suitable habitat; CSHT adds wet grassland & shepherding supplement but lacks seasonal restrictions.
Chick food availability	● Yellow	● Yellow	Both provide wet features; SFI adds pond management; CSHT includes capital items but low management payments.

3.1.2. Nest site availability

Assessment:

SFI: ● Amber – Limited provision

CSHT: ● Yellow – Some provision

SFI actions were vague and lacked detailed compulsory prescriptions describing how agreement-holders should meet the action aims. One option, *GRH1: Manage rough grazing for birds*, had potential to provide conditions for nesting Curlews but it contained no sward-height guidance, and crucially its payment rate (£121 per ha per year) was £30 per ha per year lower than a key competing action, *CLIG3: Manage grassland with very low nutrient inputs* (£151 per ha per year) which does not create a varied sward and instead focuses on creating a pollen and nectar resource. With a few

minor adjustments, GRH1 could deliver Curlew nesting conditions much more effectively. Two other actions, *GRH2: Manage wet grassland for breeding waders* and *GRH6: Manage priority habitat species-rich grassland (endorsed)*, were later positive additions to SFI 2024, with prescriptions that were more detailed and therefore more likely to provide the necessary habitat features, and an attractive payment rate compared to GRH1. Furthermore, they required endorsement from Natural England, which is likely to mean they are located more appropriately than unendorsed actions. Another SFI option, CSAM3, presented a significant risk to these potentially useful options; the creation of temporary grassland on permanent grassland is likely to effectively represent nest habitat loss for Curlew. Other actions, such as organic management actions, might create some suitable nest sites, but have relatively low payment rates (£41 and £97 per ha per year), which are unlikely to disincentivise grazing intensification.

CSHT options, meanwhile, provided clearer prescriptions than SFI actions (e.g. explicit sward heights) and, in general, higher payment rates (£500–£650 per ha per year). However, the key action for upland waders, *CUP2: Manage rough grazing for birds*, provides a much lower payment rate (£121 per ha per year), and restricts manure application, reducing its potential to benefit breeding Curlew. Furthermore, as with SFI, we identified a similar issue for CSHT with competition from other options; CGS26 pays £30 per ha per year more (£151 per ha per year). Finally, only *CGS22: Manage priority habitat species-rich grassland* is applicable above the moorland line, restricting habitat provision in some upland areas.

3.1.3. Predation

Assessment:

SFI: ● Red – No provision

CSHT: ● Red – No provision

We found that SFI or CSHT were structurally unable to deliver two types of management interventions (lethal predator control and habitat management) that will be of key importance for reducing predation of Curlew eggs and young at sufficient scale in most farmland (Porteus *et al.* 2019). This is because neither scheme:

1. offers agreements for multiple land holdings (meaning scale and intensity of predation management is not possible); nor
2. supports local facilitator roles (this means it is not possible to collect and evaluate the data required to evidence predation as a limiting factor, to conduct necessary management, or to monitor and evaluate the effectiveness of any lethal predator control conducted).

Furthermore, and in large part due to this, we found no options that provided lethal control for key Curlew egg and chick predators Fox and Carrion Crow, nor habitat management that could help reduce predation risk.

Similarly, neither SFI nor CSHT provided effective provision of predator- or livestock-proof fencing of Curlew nests. We did, however, find CSHT options that supported nest-fencing equipment as capital items (*FG7: Anti-predator combination fencing* and *FG8: Anti-predator temporary electric fencing*), but their use was limited specifically to national breeding wader target areas, lowland wet grassland used by breeding waders, and dry, open grassland used by breeding Stone-curlew *Burhinus oedipnemus*. This means areas with smaller populations, or the potential to support populations, might be missed. Furthermore, they provided no ongoing financial support to pay for the required labour, single-use equipment, or replacing equipment wear and tear for fencing of Curlew nests on farms.

3.1.4. Livestock and farm operations

Assessment:

SFI: ● Amber – Limited provision

CSHT: ● Amber – Limited provision

Some SFI actions incentivised more nature-friendly livestock management, but they largely funded stocking levels that are generally too high to create suitable habitat for Curlews and may contribute to nest disturbance. Crucially, we found no actions to reduce stocking below the moorland line.

UPL3: Limited livestock grazing on moorland sets the lowest stocking rate (0.04 GLU per ha), but this is unsustainably high for sensitive habitats (e.g. blanket bog, where 0.018 GLU is recommended).

Furthermore, two other options, *UPL1: Moderate livestock grazing on moorland* and *UPL2: Low livestock grazing on moorland*, incentivise higher stocking levels and could increase livestock densities and grazing pressure. Shepherding actions (Table 6 in Appendix 2) may help to relieve pressure, but there is no requirement to remove stock at specific times of year, and the efficacy of these is not well understood (Martin *et al.* 2013).

Similarly, a few CSHT actions applied to aspects of stock management but were largely unsuitable for stocking compatible with Curlew requirements. These actions were *CUP10: Limited livestock grazing on moorland* and *CU12–14 (Shepherding livestock on moorland options*, Table 6 in Appendix 2), plus *CGS20: Manage wet grassland for breeding waders* and *CSP5: Shepherding supplement (non-moorland)*. Natural England advice is likely to improve delivery of these actions compared to those in SFI which does not provide expert advice, but weak seasonal restrictions on grazing mean they are less beneficial for Curlews.

3.1.5. Chick food availability

Assessment:

SFI: ● Yellow – Some effective provision

CSHT: ● Yellow – Some effective provision

We found some actions which provide greater surface invertebrate food availability for Curlew chicks in SFI and CSHT.

SFI includes options *WBD1: Manage ponds*, *WBD2: Manage ditches*, and *GRH5: Manage scrapes and gutters supplement (endorsed)*. The presence of a pond management action in the SFI could provide resources for Curlews and advises controlling scrub around the edge with light grazing. However, Sites of Special Scientific Interest (SSSIs) will be ineligible for this action and there will be no advice provided alongside this to ensure ponds are appropriate for Curlews, which could limit their suitability. *WBD2* pays for vegetation to be cut rotationally and ditch clearance on a three-year rotation, which may provide additional standing water. The supplement to manage scrapes and gutters could provide suitable resources for Curlews; however, their low payment rates may mean uptake is low and delivery therefore limited.

CSHT includes options *CSP11: Manage scrapes and gutters supplement*, *CWT15: Manage ponds and bodies of water up to 2 ha*, *WN1: Grip blocking drainage channels (capital item)*, and *WN2: Creation of scrapes and gutters (capital item)*. *CSP11* provides additional wet features appropriate for Curlews, but the payment rate is not attractive (£1.17 per m² per year). *WN1* and *WN2* also only pay for capital works, not ongoing management. These may provide some suitable resources for Curlews.

3.2. Farmer interviews

3.2.1. Participant demographics, farm size, and income

Participants were mostly mid-career farmers with strong family ties to farming. Two were aged 18–34, eight 35–49, seven 50–65, and one over 65. On average, participants had farmed for 32 years (SD ± 15; range 4–50) and all intended to continue farming in the foreseeable future. Ten

participants also held part-time, off-farm jobs, mainly farming related (e.g. YDNPA staff, land agent, auction market work, sheep-shearing, drystone-walling, and farm-haulage), but two were in non-farming roles (chef and nurse), and two reported being homemakers. Seven participants owned their farm outright, five were part-owners, three were tenants, and three managed family-owned farms. All participants who owned farms had wholly or partially inherited or purchased the farm from family members. Mean farm size was 122 ha (SD ± 110 ; range 32–400 ha), and farms were managed by a mean of 1.6 full-time equivalents (SD ± 0.9 ; range 1–4). Farms produced beef, lamb, breeding Cattle *Bos taurus* (dairy and beef), and milk, sold through regional auction markets (Hawes, Leyburn, Lancaster, Bentham, and Gisburn), or large-scale processors in the case of milk.

3.2.2. Local land use and Curlews

One participant described significant post-war agricultural changes in the Yorkshire Dales, including greater mechanisation, increased livestock numbers, and a shift from hay to silage production. In more recent decades, 10 participants reported overall reductions in livestock numbers, a decline in the total number of dairy farms (with a consolidation of remaining dairy farms into fewer, larger farms), and a growing, though still minority, awareness of nature-friendly and regenerative farming practices. Ten participants noted increases in woodland cover, which they primarily attributed to land purchases by non-local owners. Five participants also reported rising levels of recreational disturbance across the Yorkshire Dales. Perceptions of Curlew population trends varied; approximately half of participants believed Curlew numbers had declined locally, and approximately half thought that populations were stable. There was also disagreement regarding Curlew nesting preferences, with approximately half of participants describing Curlews as primarily nesting in hay meadow or silage fields, and approximately half indicating that they preferred nesting in permanent pasture.

3.2.3. Previous wader agri-environment schemes

All but two participants were enrolled in Countryside Stewardship agreements, typically at Mid or Higher Tiers. Whilst most were familiar with the details of the schemes they participated in, six participants reported limited knowledge, noting that family members or land agents had arranged agreements. One participant particularly criticised a perceived reliance of farmers on land agents to administer their AES agreements, arguing that this approach often ended up prioritising financial gain over delivering environmental outcomes:

“A lot of the problem is people pay land agents to do it [AES agreements] for them ... Farmers will just say, ‘get me the most money you can,’ and they [land agents] will do that ... They [land agents] won’t spend the time to sit down with you, tell you what you can and can’t do ... If you do it yourself, you understand it.”

Eleven participants from 10 farms provided estimates of how their farm income was split between income from agricultural produce and other income streams. For eight of these farms, participants estimated other income streams (as opposed to agricultural produce) accounted for 25–50% of overall income, and the remaining two estimated 10% and c. 70%, respectively. Income outside agricultural produce sold was primarily composed of AES payments, supplemented in two cases by holiday accommodation. Six participants anticipated future changes in income sources, dependent on the structure of forthcoming ELM schemes.

According to participants, only one AES prescription had resulted in changes to management on their farms that benefited Curlews, *GS15 Haymaking supplement*, which several participants reported had genuinely delayed first cuts in Curlew-nesting meadows. Most participants reported that they, or their land agents, selected AES options that aligned with existing management practice, rather than adapting their management for environmental objectives, with one participant describing schemes as *“a payment for just farming as I am farming it now.”* One participant noted that stocking densities were naturally limited by grass growth, and that most AES prescriptions did not provide any additional stock reductions. Nevertheless, whilst the interview questions did not specifically ask this, six participants independently reported AES improved their farm’s financial viability, especially considering hill farming was difficult to make profitable. These participants felt it deterred the sale of many small farms (which they felt would likely be to landowners with intentions to plant trees or

agriculturally intensify). One participant explained how AES provided stability and reduced pressure to intensify:

“If you’re going to intensify, you need to put a lot of new buildings up ... Once you get the artificial [fertiliser] or you reseed, you grow a lot more grass ... More Cattle means more buildings, more machinery ... I’m not sure it would be any more profitable ... It’s easier to avoid that and take the scheme [AES].”

A key concern regarding AES raised by participants was that restrictions on grass-cutting and stocking dates were perceived as inflexible and arbitrary; the CSHT 15 July hay-cutting date was frequently cited as problematic, particularly in years of early growth:

“If it has so many restrictions and you’re very rigid, it puts folk off. I’ll be trapped. Then I can’t cope with the work. It’s not just a matter of money.”

AES land categorisation was another concern commonly raised by participants, with some fields hosting breeding waders deemed ineligible for AES options. One participant in particular expressed frustration at the exclusion of key fields based on mapping criteria:

“The field where I have most of my breeding waders, I don’t get any payment ... because it’s not on MAGIC [Multi-Agency Geographic Information for the Countryside, used for AES mapping].”

One participant also highlighted insufficient monitoring of AES compliance as being a key factor negatively affecting AES engagement:

“UP2 is an important option for breeding wader birds, but I know a lot of farmers that have it and just don’t bother ... If lots of farmers see others not doing it, then they won’t do it either.”

Seven participants had participated in Results-Based Agri-environment Payment Scheme (RBAPS) trials (Chaplin *et al.* 2019), reporting that performance-based approaches aligned better with farming mindsets.

“When an agri-scheme is successful ... you get the farmers to treat that scheme as a crop. You’re asking people to farm Curlew. It’s as simple as that.”

One participant raised concerns about additionality and fairness, citing biodiversity net gain (BNG) as an example, where farmers who have not managed farms to benefit nature, who are starting from low biodiversity baselines, are at an advantage compared to more nature-friendly farmers with high existing biodiversity.

3.2.4. Environmental Land Management and Curlews

Thirteen participants reported confusion and uncertainty regarding ELM, citing a lack of clear guidance and government indecision as key factors. Six of these attributed their disengagement to having limited time to explore options and ambiguity in scheme design, although some planned to familiarise themselves with ELM soon.

“We go to the meetings, and they say “oh well it hasn’t been decided yet”, so how can you make a decision?”

No participant felt that current ELM options provided sufficient financial incentives or targeted measures to effectively support breeding Curlews or other waders. One participant suggested that many farms are keen to do more and would not require large financial incentives to engage with wader-focused schemes, and seven expressed frustrations that ELM lacked outcome-driven prescriptions, species-specific objectives, and practical, hands-on interventions, such as nest-fencing or silage sacrifice around wader nests and broods:

“I think there’s a frustration that some of the new environmental schemes don’t seem to target any particular species. They’re nearly a scheme for the sake of a scheme without actually trying to deliver any outcome ... Something that actually names things [wader AES options] and says, we’re here to try and help these things [would be better].”

Financial motivations were reported by eight participants and was the most frequently reported driver for future engagement with ELM. Two participants observed that ELM had clearly signalled the

end of area-based flat-rate payments under the Basic Payment Scheme and a shift towards rewarding environmental management. However, one participant warned that unattractive ELM incentives, combined with high stock prices, could risk a return to the overstocking practices of the 1980s and 1990s. Four participants indicated they would rely on land agents, family members, or the YDNPA Farm Team to guide their ELM choices.

Two participants raised concerns about inconsistencies in payment rates between scheme options, highlighting that the SFI option CLIG3 pays £151 per ha, significantly more than CUP2 under CSHT (£121 per ha), despite offering less beneficial management for waders, in terms of livestock and farm operations management:

“I could go and annihilate most of the breeding wader nests through that option [CLIG3] and get paid more for it [than CUP2]. Which I just don’t understand ... it’s the daftest thing I’ve ever heard.”

One participant considered GRH2 a promising SFI option but warned that land eligibility criteria could exclude many farms, echoing issues with previous AES priority mapping. This participant also expressed concern that the option did not prohibit potentially harmful practices during the breeding season, such as mowing.

3.2.5. The potential model of Curlew conservation

All participants broadly supported the potential model for Curlew conservation, with none expressing significant initial concerns. When prompted further for criticisms, nine participants stressed the importance of local facilitators having sufficient farming knowledge if they were to oversee farm management plans or AES payments, so they could recognise when weather or other uncontrollable factors prevent farmers from meeting management obligations. Three participants raised concerns about increased footfall on farms, citing potential disturbance to nesting waders and biosecurity risks, such as the introduction of weeds or livestock disease. One participant noted previous experience with partnerships involving multiple facilitators *“doing not a lot”*, highlighting the need for an emphasis on tangible action rather than bureaucracy.

Participants unanimously regarded the local facilitator as essential for successful delivery of the model and its targeted interventions. Seven noted that the facilitators, predator managers, and field ecologists could help maintain farmer focus on Curlews and other waders, identify nests and breeding pairs, and provide ornithological advice, noting that this would slip without the presence of such roles on-the-ground. One participant emphasised the value of facilitators for farms when making management decisions and for reducing the risk of abuse of schemes (i.e. receiving money but not conducting management), while another suggested they could serve as intermediaries between stakeholders (e.g. farmers, predator managers, and field ecologists).

“[Without a facilitator] you [farmers] haven’t got the time [to conduct Curlew conservation interventions]. You’ll get people taking advantage of it and not gaining anything [for Curlew]. It’ll just be ‘tick that box,’ and ‘I’ll have that money,’ and nothing will really happen.”

All but one participant felt that predator management should fall under facilitators and predator managers’ remit, as farmers alone could not deliver the required level of control.

All but one participant believed the model would appeal to other farmers in the Yorkshire Dales. However, three noted that dairy farmers were unlikely to participate because the model was incompatible with their irreversible, long-term management decisions. One participant suggested leveraging existing farmer networks, such as Swaledale and Wensleydale Environmental Farmers (SWEF) or The Farmer Network (The Farmer Network 2025), as potential structures for the model.

Participants expressed mixed views on who should employ facilitators. While one participant argued that it should not be the YDNPA, due to potential conflicts of interest (e.g. regarding planning), the remainder were content with this. Two participants preferred a local individual, such as a gamekeeper or farmer’s family member, but all participants were comfortable with non-local facilitators if necessary. One participant felt that environmental NGO staff with ornithological and farming expertise would be best suited.

“I think you could do with somebody that could understand farming ... I would want them to have some form of conservation background, if possible, and probably a birdy [ornithological] background ... I think you do need that, like, a reputable bird organisation maybe providing that local facilitator.”

All but two participants believed the model could integrate well with ELM; the other two questioned its viability under SFI or CSHT without significant structural changes. Three participants involved in AES advisory roles suggested that LR was the most suitable vehicle. Two participants suggested using the Countryside Stewardship Facilitation Fund for facilitator roles, with payments for management delivered through CSHT. One participant also proposed the Capital Grants Scheme for equipment (e.g. nest-fencing, predator traps, drones, nest-monitoring), noting that current rules exclude facilitator costs. Participants flagged funding mechanisms as a critical issue for implementation.

Clarity on payment structures was another concern, with one participant advocating for transparent, outcome-based payments.

“If you provide x, y, z, you will be paid this. Facilitator comes at the end of the year. You’ve provided x, y, z, so there you are.”

No participant had any objection to ELM funds being allocated to facilitator roles, viewing this as essential to deliver higher-level management.

“I would think in something like that [the proposed Curlew conservation model] ... 90% went to the farms and 10% would pay for the facilitator.”

Two suggested the possibility of adding a form of accreditation, such as a Curlew-friendly logo akin to Red Tractor, for participating farms.

3.2.6. Lethal predator control

Sixteen participants reported that either no, or very limited, lethal predator control was currently carried out on their own farms. Seven reported that local estates or Pheasant *Phasianus colchicus* shoots undertook predator control in the wider landscape. Six participants observed an increase in generalist predators following changes to estate or shoot management, such as the absence of a full-time gamekeeper.

“The estate shoot was let by agents for six or eight years, and there was no full-time keeper ... They’ve not really done anything to keep any vermin [generalist predators, such as Fox and Carrion Crow] down. And the crows and everything have just gone, well ... just thousands of them around.”

Participants identified the following species as key predators of Curlew eggs and chicks:

- Fox (eight participants)
- “crows” (NB – this refers to several species of corvids) (six participants)
- large gulls (three participants)
- domestic and feral Cat *Felis catus* (two participants)
- Mink *Neovison vison* (two participants)
- Ferret *Mustela putorius furo* (two participants)
- Buzzard *Buteo buteo* (one participant)
- Red Kite *Milvus milvus* (one participant)

Eight participants did not view any predators as a significant threat to livestock, but others reported risks to weak or newborn lambs from species such as Carrion Crow (seven participants), dogs (three participants), large gulls (one participant), Fox (one participant), and Badger *Meles meles* (one participant). Seven participants noted they already benefited from reduced predation on lambs due to predator management on nearby estates. One participant, recalling previous experience farming in the Lake District away from grouse moors, reported “massive losses at lambing time with Foxes” during that time.

All participants were willing to allow lethal predator control on their land through shooting and trapping, though two had concerns about increases in Rabbit *Oryctolagus cuniculus* populations following predator control. Eight believed local gamekeepers were best positioned to conduct this work, due to familiarity with the area, accountability, and alignment with estate management. However, two participants preferred independent contractors, citing concerns that increased gamekeeper activity could encourage more sport shooting and gamebird releases, or reinforcing existing power imbalances between estates and smaller farms. The remainder stated no preference, but all participants were content with the prospect of predator control being delivered either by local gamekeepers or by independent contractors.

All participants supported the inclusion of lethal predator control options within ELM, viewing it as essential for maintaining or improving wader breeding success, particularly Curlew. Despite some mentioning risks to newborn lambs, all participants reported their support was due to a desire for genuine environmental outcomes, not any perceived positive or negative effects on their own farming operations. Participants also expressed that implementing lethal control at an appropriate scale, ideally across neighbouring farms, would increase its effectiveness and appeal.

One participant suggested targeting ELM wader options at estates, which already employ skilled staff and have established relationships with tenant farms, enabling predator control at scale:

“It may be cost-effective for ELM to target estates; they have the skills and the network to coordinate clusters.”

However, one participant stressed that acceptability depended on individual relationships with estates:

“It depends on which estates ... and the individual. Some I wouldn’t mind, but some I would not want roaming on the land.”

3.2.7. Nest-protection interventions

Table 3 summarises nest-protection management tasks and interventions, incentives, and required payment rates.

3.2.7.1. Nest-finding

Most participants reported occasional chance encounters with wader nests (c. 1–2 per year) during routine work such as driving farm vehicles or walking or inspecting fields. No participant conducted systematic nest searches; one participant reported deliberately observing bird behaviour to discern approximate breeding locations but avoided approaching nests through fear of causing disturbance. While four participants expressed willingness to increase nest-finding effort if schemes offered clear options or financial rewards, the remainder did not feel nest-finding payments would influence their behaviour. The four who did, suggested payment levels c. £100 per nest as sufficient to incentivise greater nest-finding. Nevertheless, concerns about disturbance were common, and farmers unanimously preferred that nest-finding be conducted by others (e.g. field ecologists).

3.2.7.2. Nest fencing

All participants reported that they supported the idea of temporary electric fencing around nests to protect Curlew nests from predators, livestock, and farm operations. However, this support was conditional on compensation for any associated land-use restrictions (e.g. loss of grass cropping area). All but one participant reported that livestock were electric fence trained, minimising potential issues between livestock and fences. Two participants felt nest-fences functioned as a visual reminder to avoid the area when conducting farm operations or other potentially disturbing work on the farm. For the 10 participants who reported any preference on who would deploy fences, all preferred it was not farmers, citing time constraints during the April–June peak workload. All participants were happy with allowing field ecologists to deploy fences on their farm. Nevertheless, three participants reported they could deploy fences themselves with adequate financial incentives and training, but stressed the need for guidance regarding disturbance and nest abandonment:

“The last thing you want to do is try to help and make things worse.”

Table 3. Summary of nest-protection interventions, key participant perspectives, and required payment rates. All costs based on farmers' estimates.

Intervention	Key participant perspectives	Key participant incentives	Required payment rates to supplement farm income forgone (£)
Nest-finding.	Farmers find c. 1–2 nests per year opportunistically, but concerned about disturbance; they preferred others (e.g. field ecologists) to find nests.	Payment and training for c. half of participants, c. half felt they would never engage with nest finding.	c. £100 per nest.
Electric nest-fencing (around wader nests).	Supported by all participants; most prefer others (e.g. field ecologists) to deploy; training needed if land managers expected to deploy.	Payment, equipment, and training for c. half of participants, c. half felt they would never engage with nest-fencing.	Not quantified, no income forgone (provided nest is not in grass crop – see below).
Lambing field stocking density management.	Considered unfeasible without high rates of compensation; partial exclusion possible.	Financial compensation, and long-term guarantees critical.	c. £2,400 per ha per year.
Grass cropping management (around wader nests).	Real concerns regarding feasibility. Costs difficult to generate, as availability of replacement livestock feed highly variable between years, and micro-efficiency costs of unforeseen uncut patches.	Financial compensation (long-term guarantees important but not as critical).	c. £750 per ha per cut affected. c. £1,500 per ha per year.
Fertiliser/manure restrictions (wader nesting meadows).	Real concerns regarding feasibility, fertiliser/manure applied at crucial times in farm cycle, prohibiting April–July likely to have key impacts on yield, and frustrating for farmers.		c. £350 per ha per crop.
Chain harrowing & rolling (wader nesting meadows).	Regarded as more feasible, often not conducted under existing management; avoidance possible with incentive.		Not quantified, inexpensive.

3.2.7.3. Grass mowing management

All farms producing hay did not cut until late July at the earliest, posing minimal risk to breeding waders. However, participants from the five farms who produce silage reported harvesting silage from mid June onwards; these participants all stocked Sheep *Ovis aries*, and reported exclusively that dairy farms at lower altitudes without Sheep would cut from mid May onwards. These participants acknowledged that silage harvesting presented a risk to wader nests and chicks and reported routinely checking for nests and other wildlife during mowing but that detecting nests and wader chicks in dense silage swards is difficult. Under their current farming systems, these participants felt they could only leave small uncut areas (0.03–0.05 ha) around nests without prohibitively significant loss of livestock feed. Larger uncut areas around nests would require compensation for both lost yield and additional labour.

Three participants provided usable estimates of income lost from leaving areas of silage uncut; all three participants approached this by calculating the lost yield of silage (measured in round bales) per ha, and how much it would cost to replace these round bales. Income lost per silage cut per ha ranged from £520–£960 (Table 4), with a mean of £690. However, participants felt that in practice, silage mowing management around nests would usually affect two silage cuts. Furthermore, they felt additional time and transport costs would equal c. £100. Taking c. £700 mean cost per cut, multiplied by two cuts affected, adding time and transport costs, participants felt c. £1,500 per ha would make participation in nest protection schemes viable (or c. £90 per nest protected, if leaving only 25 m by 25 m (0.06 ha) uncut. However, two participants noted that even with protection from mowing, chick survival might remain low due to predator attraction to recently cut fields.

Table 4. Estimated mean cost to farm income per area of silage left uncut, measured by number of round bales lost per hectare per cut.

Participant	Round bales per ha	Round bale price	Income lost per ha per cut
5	32	£30	£960
10	20	£30	£590
17	17	£30	£520
Mean	21	£30	£690

3.2.7.4. Livestock management

All participants reported that areas with high livestock densities from April to July have the potential to negatively affect breeding Curlews and other waders through trampling and disturbance. Silage fields and hay meadows on Sheep farms (hereafter referred to as lambing fields) were highlighted as the greatest Curlew–livestock conflict risk area, where participants reported stocking densities on farms often increased by a factor of five during lambing from March to May (10–25 ewes per ha in lambing fields, compared to 2–5 ewes per ha on average).

Participants reported that movements of stock through lambing fields varied unpredictably between years according to weather, number of single or twin lambs, and other unpredictable factors. Participants reported that keeping lambing fields with nesting waders free of stock in April–May would require substantial overall reductions in the farm’s Sheep flock size, which they considered unfeasible without long-term, guaranteed compensation for income forgone. Four participants provided usable estimates of the annual income forgone per ha did by taking the number of ewes per ha they reported stocking on fields during lambing, multiplying it by the average number of lambs each ewe births per year, and subtracting annual husbandry costs per ewe (Table 5). Based on this approach, participants’ estimated average annual income forgone from excluding stock from a given lambing field ranged between £1,900–£3,200, but taking mean values for each category, this came to c. £2,400 per ha. Participants reported this income forgone was entirely composed of lost produce of lambs, no other factors. Participants also noted that if they were to reduce overall Sheep numbers, rebuilding flocks would be more costly than maintaining them:

“It’s a lot easier to stay at your number [of livestock] than it is to go back up.”

Table 5. Usable estimates of annual loss of farm income due to Sheep stock reductions required to leave Curlew-nesting areas free of stock in the Curlew nesting period April–May.

Participant reference number	Ewe husbandry cost	Lambs per ewe	Lamb price	Ewe profit	Ewes per ha (lambing)	Profit per ha per year
1	£50	1.5	£120	£130	25	£3,200
3	£40	1.5	£150	£185	10	£2,200
10	£40	2	£140	£240	12	£3,000
14	£40	1.5	£100	£110	12	£1,900
Mean	£50	1.6	£120	£130	14.8	£2,400

Though no participant reported that they could leave meadows favoured by breeding waders unstocked without compensation, two participants suggested partial exclusion in fields using temporary fencing would be possible without overall flock reductions, but this may incur greater risk of soil compaction, overgrazing, or negative impacts on livestock welfare. One participant suggested earlier indoor lambing to keep wader nesting areas free of livestock during April–June, but this option would entail significant additional costs (e.g. additional farm infrastructure and labour) and higher risk of welfare issues. No participant reported that typical stocking levels in permanent pasture (low during lambing in April–May, and typically 2–5 ewes, plus any Cattle, per ha after this) were likely to affect nesting success of breeding waders.

3.2.7.5. Chain harrowing and rolling

Ten participants identified rolling and chain harrowing as significant threats to nests, reporting a near 100% chance of nest destruction if these operations were conducted in fields with wader nests. However, usage patterns between farms varied; four participants never conducted these operations, while one reported they were standard practice on c. 80% of silage fields or hay meadows. Participants on farms who did conduct chain harrowing or rolling felt that avoiding rolling and harrowing during April–July was more feasible than limiting manure applications but would require payments to offset reduced flexibility in field preparation. One participant stated:

“For any environmental scheme aimed specifically at waders, I would say forbid chain harrowing and rolling in spring – end of chat. If you want our money [AES payments], you cannot do that [chain harrowing and rolling].”

3.2.7.6. Manure and fertiliser application

Participants generally felt that spreading farmyard manure, slurry, or artificial fertiliser during the breeding season posed a small direct nest or chick crushing risk within vehicle tyre paths, but little risk beyond that. Whilst participants also felt farmyard manure presents a small crushing-risk from the larger, solid aggregates of manure, they did not feel that slurry or artificial fertiliser presented a risk. Some observed that birds were attracted to recently manured fields, suggesting positives along with risks. Furthermore, restrictions on manure and fertiliser spreading April–July in key wader-nesting fields, particularly in silage fields and hay meadow, were considered extremely challenging, due to limited alternative manure-and fertiliser-spreading time windows. Participants suggested this could halve grass yields; all but one participant could not quantify these costs, and this participant estimated approximately £350 per ha per year. Participants emphasised that such restrictions would therefore require corresponding financial compensation.

4. Discussion

In this report we assessed the provision for Curlews in SFI and CSHT actions, two land management schemes under ELM, to assess the extent to which English Curlew populations might benefit from the transition to ELM. We also interviewed a small sample of farmers to collect their perspectives on Curlew conservation and relevant land management on their farm and in the local area, existing AES actions, and common Curlew conservation interventions which could form the basis of novel targeted Curlew or wader options AES options under ELM. There are few existing studies of this nature on Curlews and ELM, so the results presented here have significance for a range of Curlew conservation stakeholders, especially policymakers. In this discussion we review the key findings, strengths, and limitations of the ELM review (section 4.1) and the farmer interviews (section 4.2), the implications of these key findings for conservation management, policy, and research (section 4.3), and make conclusions and recommendations based on these implications (section 4.4).

4.1. ELM review key findings, strengths, and limitations

The results of the review broadly indicate that ELM is poorly suited to preventing harmful management changes in existing upland Curlew population strongholds, as untargeted SFI grassland actions which provide little benefit to waders risk outcompeting existing beneficial CSHT actions. SFI actions are vague in their prescriptions, unlike key CSHT actions, which for example prescribe clear stocking parameters across the year. SFI and CSHT scored red (no provision) or amber (no effective provision) against all key Curlew breeding requirements except chick food availability and nest site availability, and neither scored green (effective provision) against any requirement (Table 2). Furthermore, the review also highlighted key structural issues in the lack of effective local facilitation and multi-holding agreements, which may limit the ability of SFI and CSHT to deliver predator management and targeted nest-protection interventions.

The key findings of the ELM review support a widespread recognition that English AES provide insufficient support for breeding Curlew or other wader recovery. The UK Curlew Species Action Plan recommends “*an overhaul of wader-relevant Land Management Scheme options, with schemes in place to fund ... habitat management, predator exclusion fencing, evidence-led lethal and non-lethal predator management, delayed/sacrificed crop management, stock management ... Local advisers support work, developing management plans in partnership with collaborating farmers at a landscape scale, and with space for adaptive management*” by 2028 in its milestones for recovery (Thompson *et al.* 2026). However, no published studies have reviewed English AES provision of Curlew breeding requirements in a similar way to this study, and clearly describing and explaining key strengths and weaknesses of SFI and CSHT should aid land managers and policymakers in adapting current and future management and policy to meet national targets. The key strength of the review lies in its combination of expertise regarding Curlew breeding ecology, AES policy, and local farm management. Furthermore, the study should be readily repeatable as ELM develops, to monitor improvements in SFI and CSHT support for Curlew breeding requirements, and the SAP milestones for recovery. The inclusion of farmer perspectives (section 4.2) also strengthens the conclusions of the ELM review.

However, the key limitation of the ELM review is that it purely theoretically compares assumed Curlew breeding requirements and available interventions against SFI and CSHT option management descriptions and does not gather empirical data on Curlew breeding outcomes under different management actions. Studies have shown that theoretically determined Curlew habitat requirements may have unintended and unexpected negative impacts on breeding success on the ground (Kelly *et al.* 2021). Nevertheless, previous studies have shown that specifically wader-targeted AES actions are more effective than multi-taxa or habitat-focused AES actions (Franks *et al.* 2018); this supports a key finding of the review, that targeted wader AES actions risk being outcompeted by higher-paying, untargeted SFI grassland options with vaguer prescriptions. Furthermore, the key interventions the ELM review identified as being insufficiently supported have been shown to be successful under AES, though these interventions’ probabilities of success are highly variable and context-dependent (Franks *et al.* 2018).

Whether farmers and land managers delivering these interventions have access to expert advice and facilitation can often significantly increase the chances of the interventions' success (Ingram 2008). Overall, the key finding of the ELM review is that SFI and CSHT are currently insufficient to support Curlew and other wader breeding requirements.

The ELM review scope did not include the wider efficacy of scheme design for delivering management, instead focusing on the availability of options within SFI and CSHT or the structural issues which may cause a lack of options. The efficacy of individual actions is heavily influenced by wider scheme structure; for example, SFI has few mechanisms to guide the combinations, scales, and locations in which actions are taken up by farmers and other land managers. The positive impacts on interventions funded by ELM are also limited by the vague prescriptions within actions and lack of advice. Therefore, even where actions for breeding Curlews and other waders are available in schemes, their impact may be limited. Despite the limited action provision of CSHT, it may be significantly more effective at delivering outcomes for Curlews, given its access to expert advice. LR also has significant potential to deliver landscape-scale land use change that can be tailored to benefit Curlew and other threatened species. However, both LR and CSHT are highly competitive, due in part to the limited proportion of Defra funding allotted to these schemes. Scaling up access to these schemes would likely benefit Curlew conservation, and wider farmland biodiversity recovery.

4.2. Farmer interviews key findings, strengths, and limitations

The interviews generated 23 hours and 35 minutes of in-depth farmer perspectives on relevant local land management, existing and potential future AES interventions, and associated costs to farm income. The interviews showed that our sample of farmers in the Yorkshire Dales recognised the importance of both predation pressure and farm management in determining Curlew breeding success. Participants were broadly supportive of existing upland wader AES (provided payment rates improve) and expressed interest in potential new options focused on predator management and targeted nest-protection. Most participants felt they needed support with tasks they cannot carry out themselves (e.g. lethal predator control and locating nests) and emphasised that actions negatively impacting farm income must be fully compensated. They were willing to collaborate with local facilitators, predator managers, and field ecologists to deliver this work. Participants' emphasis on business viability as the primary determinant of AES engagement is consistent with previous research, as were key secondary motivations relating to environmental outcomes and preserving local culture or way-of-life (Hejnowicz *et al.* 2016, Young *et al.* 2020, Barghusen *et al.* 2021, Reichensperner *et al.* 2024). Other themes that participants reported shaped engagement: preference for local, in-person advice; interest in results-based payment approaches; concerns about loss of control or restrictive prescriptions, and the spatial design of AES eligibility (which land qualifies), also broadly align with previous studies (Chaplin *et al.* 2019, Sumrada *et al.* 2021, Was *et al.* 2021, Massfeller *et al.* 2022, Thiermann *et al.* 2023).

The strong working relationships established over the three years of collaborative working between the interviewer and participants likely improved the depth and openness of information shared. Interviewees also had direct experience of an on-farm ornithologist (the interviewer) locating Curlew nests and offering management advice, which gave them more confidence to endorse or critique the proposed ELM interventions discussed during the interviews. Finally, the inclusion of approximate cost estimates further increases the study's value for developing Curlew-focused land management and upland policy.

The main limitation of this study is that we do not know the extent to which the participants of this study (18 farmers from 11 farms) are representative of the broader farming community in the Yorkshire Dales or the wider English uplands. Their existing involvement in AES and a wader research project may also have influenced the findings in two ways: (1) having seen proof-of-concept interventions in practice, they may have been more inclined to support the proposed options than farmers without such experience (so results may overestimate farmers' support of proposed options); and (2) their familiarity with an existing conservation project may have constrained their ability to think beyond its parameters. Nevertheless, the participants are likely similar to the farmers who

would realistically engage with wader-focused AES in these landscapes. Furthermore, although the sample is skewed toward smaller and less intensively managed farms, their costing processes and reasoning are likely still sufficiently representative of the wider local community.

Due to the nature in which they were derived, participants' cost estimates reported in this study are purely indicative, and whilst they are broadly comparable to other attempts to quantify costs, they are higher. Cost estimates for silage, livestock, and manure-spreading management were derived from farmer responses during two-hour interviews alone. Very few published studies have directly quantified the costs of silage or hay meadow management, but our silage-sacrifice cost estimates are higher than, but broadly consistent with, an unpublished estimate of c. £1,000 per hectare based on reduced forage nutrition (P. Miller, personal communication, Feb 2025). Actual compensation needs could be lower, for instance, if farmers overestimated costs when considering major business changes, or higher, due to unforeseen practical expenses. Whilst all the indicative costs estimated in this study will be useful in directing future research and AES development, we recommend these are strengthened with more robust means of estimating holistic costs to farm business (Redman 2025, Farm Business Survey 2026). Discrete Choice Experiments could also be used to build upon these cost estimates to develop more rigorous payment rates and systems for management actions to benefit waders (Thiermann *et al.* 2023).

4.3. Implications for management, policy, and future research

Our study highlights two overarching problems: (1) SFI and CSHT may put existing beneficial management in Curlew strongholds at risk, and (2) SFI and CSHT cannot support required interventions where existing land management cannot support sufficient Curlew breeding success. This means that in the short term, stakeholders will need to secure funding outside AES to protect Curlew strongholds and recover populations at risk. LR, the highest tier of ELM, may offer a route to providing required management, but its complex and highly competitive application process limits its spatial remit. At present, CSHT is also challenging to access due to limited scheme resources. There are several options for policymakers to improve SFI and CSHT's support for upland Curlew conservation. A key short-term measure for ELM policymakers would be to review and increase the payment rates of upland wader-targeted CSHT options, to make them more competitive, and improve the accessibility of these options for farmers. Another, longer-term, but equally important measure would be to develop mechanisms particularly within CSHT to more effectively support nest and brood protection interventions, providing farmers with advice, facilitation, predator management, and locating wader breeding attempts on-the-ground, with mechanisms that are sufficiently flexible to address the various local contexts of remaining English Curlew and other wader breeding grounds. This would likely require local facilitators coordinating paid or volunteer predator managers and field ecologists for predator management and locating and monitoring Curlew breeding attempts, respectively. The Farmer Collaboration Fund (FCF) could support these requirements; however, if policymakers wish the FCF to support this, it must be developed so it can support single-species (e.g. Curlew) or multi-species (e.g. wader) focused farmer collaborations. Given the scale of wader conservation on UK farmland (Wilson *et al.* 2020), and the value of Curlew conservation to rural communities and the wider environmental benefits (Goodall *et al.* 2023), waders could provide a key focal conservation area for the FCF.

The costs of advice, facilitation, predator management, and locating wader breeding attempts on the ground must be weighed against ELM budgetary constraints, to assess whether feasible scales of delivery are sufficient for Curlew population recovery. However, existing research on the specific predator control and nest protection interventions discussed during the farmer interviews has rarely sufficiently evaluated their cost-effectiveness across a sufficiently representative range of landscapes where Curlews breed; future research should prioritise further costing interventions, as this study has partly done, as well as their effectiveness in increasing Curlew breeding success, to allow policymakers to decide upon realistic scales of delivery considering CSHT budgetary constraints.

The ELM review and farmer interviews raised issues around the lack of specificity of SFI management prescriptions; however, interview participants also raised rigid AES prescriptions as an issue,

preferring results-based approaches to AES payments (most participants were involved in a Defra results-based approach to payments trial (Chaplin *et al.* 2019)). This apparent contradiction speaks to the challenge at the heart of AES: providing clear environmental outcomes whilst attracting sufficient farmer participation to be environmentally effective, within governmental budgetary constraints. Previous research has highlighted hybrid payment designs (blending AES payments for management and results), as the most cost-effective AES payment model (OECD 2022). Payments based on wader breeding density or outcomes would be challenging to monitor, partly dependent on factors outside farmers' control, and highly context-dependent, but hybrid payment designs could offer a cost-effective model for wader AES, especially CSHT.

In terms of local management in the Yorkshire Dales, our results suggest that permanent pasture broadly supports Curlew nesting habitat requirements, as typical grazing levels and timings do not majorly overlap with sensitive Curlew laying and incubation periods. Participants reported the main threats occur outside permanent pasture, particularly in hay meadow and silage fields, where intensive stocking during lambing (March–May), and chain harrowing, rolling, and mowing (March–August) can deter Curlew and other ground-nesting bird nesting attempts or threaten existing nesting attempts. Participants' approximate cost estimates suggest whole-field interventions would be prohibitively expensive (compared to AES payment rate precedents), but small-scale, targeted measures, such as protecting individual nests from key risks (provided field ecologists can support farmers with nest-finding) or low-cost high-reward management changes such as preventing chain harrowing or rolling during April–July, may offer cost-effective options. However, further research into 1) the costs of local facilitation, lethal predator control, and nest-finding (using traditional methods and new technologies such as thermal imagery and drones) and 2) the relative importance of permanent pasture, silage, and hay meadow for Curlews and other breeding waders in the Yorkshire Dales National Park and wider English uplands, is required to rigorously assess the cost-effectiveness of developing CSHT actions outside permanent pasture.

Regarding nest protection measures on hay meadow and lambing fields in the Yorkshire Dales, participants reported that the success of this would depend upon the ecological and agricultural knowledge of local facilitators and field ecologists, to minimise potential stakeholder conflict regarding agricultural and biodiversity outcomes. Facilitators in these types of landscapes could develop farm and predator management plans, support farms with AES applications and management advice, and coordinate predator managers and field ecologists to support management plans with predator control and locating wader breeding attempts. In the Yorkshire Dales, predator managers could be local gamekeepers or independent contractors but would require financial compensation. Likewise, in the Yorkshire Dales local population density means field ecologists are unlikely to come from local volunteer ornithologists, so locating Curlew nesting attempts would likely need to be provided by paid staff, e.g. seasonal or permanent national park employees. Whilst the local context for delivery would vary between different landscapes where Curlews breed, the principle of local facilitators developing farm and predator management plans, then coordinating predator managers and field ecologists to support management plans with predator control and locating wader breeding attempts, would remain the same.

4.4. Recommendations

We recommend the following to improve the effectiveness of ELM for Curlew recovery in upland landscapes like the Yorkshire Dales:

1. **Short term:** scale up access to CSHT and review the accessibility and payment rates for CSHT wader actions that create and maintain favourable habitat conditions for waders on upland pasture (e.g. CUP2). These should be supported by actions in SFI which support creation and maintenance of this habitat. Such wader actions must be widely accessible and financially competitive with alternative actions which have limited benefits for breeding waders (e.g. CLIG3).
2. **Medium term:** add ELM scheme design features to allow support for local facilitators,

predator managers, field ecologists, and multi-holding agreements, which are needed to ensure public-funded predator management and nest-protection interventions are cost effective.

3. **Longer term:** development of a novel suite of Higher Tier ELM actions (SFI does not provide the mechanisms required) that include evidence-led lethal and non-lethal predator management (effectively targeted and implemented at sufficient scale) and targeted nest-protection interventions, with the flexibility for local facilitators to coordinate and support predator managers, field ecologists, and relevant farm management across multiple holdings. Consider the use of hybrid payment models to support this, which combine action-based and result-based payments.

Failure to address these issues will make continued declines of Curlews and other waders more likely, despite stated government commitments to halt and reverse these declines.

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Appendix 1.

Interview questions:

You and your farm (c. 30 mins)

1. You
 - a. Are you 18-34, 35-49, 50-65, or 66+?
 - b. How long have you been a farmer?
 - c. Do you intend to stay in farming in the foreseeable future?
 - d. Do you have another job outside farming?
 - i. What is it?
 - ii. Is your secondary job full-time, part-time, or other?
2. Farm ownership, management, and size
 - a. Do you own the farm you manage?
 - b. How long have you managed this farm?
 - c. How did you come to own/manage this farm?
 - d. Do you think your farm's management will change substantially over the next 10/50 years?
 - i. How so?
 - e. How many fields do you manage (or have managed for you), and approximately what area of land does this come to?
 - f. How many part- or full-time equivalent people work on this farm?
3. Farm income
 - a. What are your main agricultural produce?
 - b. Where do you sell this produce?
 - c. Does that vary significantly between years?
 - i. How so?
 - d. To what extent is your farm dependent on non-agricultural income, e.g. government farm support payments, or diversification?
 - i. Is that likely to change in the next 10 or 50 years?
4. Livestock
 - a. Which types of livestock do you keep on your farm?
 - b. Approximately what number of each livestock type do you keep on your farm?
 - i. What kind of rotation of stock between fields do you do conduct?
 - c. What produce do you sell from these livestock?
5. Agri-environmental schemes
 - a. Do you have active AES options currently in place on your farm?
 - i. Which AES options?
 - ii. When do these come to an end?
 - iii. If no – Have you had active AES on your farm in the past?
 1. Which AES options did you have?
 - iv. Which AES options have you been involved with that you think help Curlew and other waders?
 1. Which of these options are specifically designed to help Curlew and other waders?
 - v. What have you liked about wader AES options in the past and present?
 - vi. What have you not liked about wader AES options in the past and present?
 - vii. Do you think the AES options you have chosen in the past have provided good outcomes for Curlew and other waders:
 1. On your farm?
 2. In upland farms in general?
6. Do you feel you have a good understanding of the ELM options available to you under SFI, CS, and LR?

7. Which SFI and CS options under ELM have you chosen, or are currently considering?
 - a. Which of these are Curlew or wader-specific?
8. Do you think current ELM options will provide good outcomes for Curlew and other waders:
 - a. On your farm?
 - b. In upland farms in general?
9. What do you think is missing from current options that would help Curlew?

Curlew in the Yorkshire Dales (c. 20 mins)

1. What changes have you seen in farming across the Dales in your lifetime?
 - a. What about land management outside farming?
2. What changes have you seen in the wildlife on your farm and across the Dales in your lifetime?
3. What cultural value do you think Curlew have in the Yorkshire Dales?
 - a. Do you think this is similar across the English uplands?
4. How do you feel Curlew numbers have changed over your lifetime:
 - a. On your farm?
 - b. In the Dales in general?
5. Which aspects of current farming practices in the Dales do you think help Curlew?
6. Which aspects of current farming practices in the Dales do you think stop Curlew successfully raising young?
7. What other reasons outside farming stop Curlew successfully raising young?
8. Do you think Curlew can successfully nest, hatch, and raise young to fledging with current farming practices on your farm?
 - a. In the Dales in general?
 - b. Do you think this has changed over time?

Model of farmland Curlew conservation (c. 20 mins)

Hand them document (Figure 1) with model for conservation discussed/developed previously at group events and spend five minutes running through it with them.

9. In general, what are your thoughts on this model of conservation management illustrated here?
 - a. Which elements of it do you like?
 - b. Which elements of it do you not like?
10. What do you think is the importance of the local facilitator in this model?
 - c. Which elements, if any, would be impossible, difficult, or less effective without a local facilitator?
 - d. In this model, it may be that the local facilitator oversees payments to farms based on their delivery of management – do you have any concerns about that approach?
 - i. What are your specific concerns around that approach?
11. What do you think is the importance of the predator controller in this model?
 - a. Which elements, if any, would be impossible, difficult, or less effective without a predator controller?
 - b. In this model, it may be that the local facilitator oversees payments to the predator controller based on their delivery of management – do you have any specific concerns about that approach?
12. Do you think farmers in the Yorkshire Dales more widely would be happy with this model of Curlew conservation?

- e. Which elements of it do you think they would like?
 - f. Which elements of it do you think they would not like?
14. Do you think this model would be feasible within ELM, as you understand it?

Farm- and landscape-level interventions (c. 20 mins)

Lethal predator control

15. What lethal predator control is currently conducted on your farm?
- a. Who conducts that control?
 - b. How confident are you that you know what predator control is currently conducted on your farm?
 - c. Is any lethal predator control is currently conducted in the area around your farm?
16. Which predators do you think present the greatest risk to Curlew eggs and chicks on your farm?
- a. *As each predator is raised, discuss whether of eggs or chicks*
 - b. And across the Dales?
17. Do you think any predators pose a risk to your livestock or other aspects of your farming operations?
- a. Which predators and why?
 - b. And across the Dales?
18. Based on your answers to the previous questions, what are your views on the legal protection of some bird and mammal predators (e.g. gulls, birds of prey, and Badgers)?
19. Would you support lethal predator control of Fox, Stoat, and Carrion Crow on your farm?
- a. Would you allow both shooting and trapping methods?
 - i. Why is that?
 - b. Who do you think would be best-placed to conduct lethal control of these species on your farm?
 - i. And more widely, on farmland across the Dales?
 - ii. Would you be happy to work in partnership with local estates to provide gamekeepers access for lethal predator control on your farm?
 - 1. Do you foresee any issues with working with estates in this way?
 - 2. Do you foresee any wider benefits of working with estates in this way?
 - iii. Would you be happy to work in partnership with a specially employed predator controller (not linked to local estates) to provide them access for lethal predator control on your farm?
 - 1. Do you foresee any issues with working with a specially employed predator controller in this way?
 - 2. Do you foresee any wider benefits of working with a specially employed predator controller in this way?
 - c. For lethal predator control to be effective, it must be conducted across wide areas of at least 2000 acres, ideally larger, which for farmland in the Dales will likely contain many different holdings – do you think your neighbouring farms might support lethal predator control at this scale?
 - i. Do you foresee any issues with this approach?
 - ii. Do you foresee any benefits with this approach?
 - iv. Do you think farms in the Dales could often get together to agree upon it if it was an option under ELM?
20. Would you support the inclusion of lethal predator control in future ELM ground-nesting bird options?

Field-level interventions (c. 30 mins)

Nest-finding

21. Have you found Curlew or other wader nests on your farm in the past?
 - a. Approximately how many of which species do you find per year?
 - b. How do you tend to find these nests?
22. If there was a financial incentive for finding nests on your farm, do you think this would encourage you to spend more time and effort finding them?
 - a. What approximate range of payments per nest found would incentivise you to find and report nests opportunistically when carrying out work on the farm?
 - b. What about actively nest search separately to work on the farm?

Temporary nest-fencing

23. In general, would you support the use of temporary nest-fencing to protect nests on your farm?
 - a. Why is that?
24. Would you be happy with temporary nest fences deployed in meadows that may be cut when nests are active?
 - a. Are there any risks associated with having temporary nest-fences up during cutting?
25. Would you be happy with temporary nest fences deployed in fields with livestock in them?
 - a. If no, why is that?
 - b. Which livestock, if any, would be problematic with temporary nest fences?
26. What kind of benefits and limitations do you think nest-fences have for Curlew conservation?
 - a. For your farm management?
 - b. For Curlew breeding success?
 - c. Do you have any concerns about fences marking nests for predators?
27. Who do you think would be best-placed to deploy, maintain, and collect temporary electric fencing around Curlew nests?
 - a. Why is that?
 - b. Do you think fences could be deployed by farmers if time and equipment was compensated for?
28. **if they had a fence on their farm in 2024** What was your overall experience with fencing in 2024?
 - a. What worked?
 - b. What didn't work so well?

Meadow management

Fertilising

29. Do you fertilise fields on your farm?
 - a. Which fertilisers do you use?
 - b. How do you apply these?
 - c. Approximately where and when do you apply these?
30. How viable would it be not to fertilise fields where Curlew nest on your farm between April and June?
 - a. *Likely answer will vary by field – gauge how many fields (or the proportion of meadows) this would be possible*
 - b. Can you estimate how many pairs of Curlew usually nest in the fields where it wouldn't be possible to avoid fertilising during the relevant period?
 - c. What would be the knock-on effects of not fertilising Curlew-nesting fields on your farm between April and June?

- d. What would be the financial implications of not fertilising Curlew-nesting fields between April and June on your farm?
 - i. What cost per field/ha?
- e. Will these effects and costs be true of most farms in the Dales?
- f. If these costs could be fully compensated through ELM, how likely would you be to choose that option?

Stock management

- 31. Do you think stocking densities in fields during Curlew's peak laying period (April–May) can delay or completely prevent Curlew from nesting when it is optimal for them?
- 32. Once nests have been laid, do you think stocking densities in fields during the peak nesting period (April–June) can cause issues for Curlew?
 - a. If so, how?
- 33. Which field-types are stocked on your farm between April–June?
 - a. Run through approximately where stock are on the farm (meadows or pasture) between April–June.
 - b. When are livestock excluded from meadows on your farm?
 - i. Once livestock have been excluded from your meadows, do they remain free from livestock until July?
- 34. Do you lamb outdoors?
 - a. When?
 - b. Where – approximately how many fields do you use for lambing?
 - c. As far as you know, how many pairs of Curlew ever nest in any fields you use for lambing?
- 35. To the best of your knowledge, how many pairs of Curlew nest in meadows in general on your farm?
- 36. How viable would it be to exclude livestock from your meadows where Curlew nest from April through to June? (ask in theory if no meadow-nesting Curlew!)
 - a. *Likely answer will vary by field – gauge how many fields (or the proportion of meadows) this would be possible*
 - b. Roughly how many pairs of Curlew would be in these meadows where it wasn't possible to avoid stocking during the relevant period?
 - c. What would be the knock-on effects of excluding livestock from Curlew-nesting meadows from early April to June on your farm?
 - d. What would be the financial implications of excluding from Curlew-nesting meadows from early April–June on your farm?
 - i. Is it possible to estimate these costs by field or ha?
 - e. If these costs could be compensated through ELM, would you choose that option?
- 37. Would you be open to manipulating stock movements to encourage Curlews to nest in fields that will be easier to manage for them?
- 38. Do you have any other ideas how livestock disturbance, trampling, and predation risk for Curlew and other waders could be mitigated on your farm?

Grass-cutting

- 39. Do you take cuts of grass for livestock feed from any fields in your farm?
 - a. (If no) Do you have any previous experience with taking cuts of grass for livestock feed?
 - i. When and where is this experience from?

No need to ask any further questions in this section, if not

- b. Are these cuts to produce silage, traditional hay, or something else?
 - i. If a mix of each – roughly how many fields (area) of each?
- c. Are the fields in your farm all either divided into clear meadows or permanent pasture, or is the situation more complicated?

- i. How so?
 - d. Do you sell any of the resulting feed, or use it on your own farm?
 - i. If a mix of each – rough what proportion sold and used on farm?
 - e. Approximately which dates do you generally take cuts for your fields?
 - f. Do you undertake cuts yourself, use a contractor, or other?
 - i. ****If other**** what?
 - g. Do you/contractors use a forage harvester, or other machinery to harvest grass?
 - i. Can you describe a bit more about how cuts are taken on your farm?
 - h. *If cuts in May and June (usually silage)* what potential would there be on your farm, under current management, for you to leave areas of uncut grass around Curlew nests until the nests have hatched and young broods moved away or fledged (may range from 1–4 weeks)?
 - i. *If no cuts in May and June, ask in general* what would be the financial costs to you (per hectare or acre) for leaving areas of silage uncut around nests until nests have hatched and young broods moved away or fledged?
 - i. If patches are left for between 1–5 weeks in May and June, is the uncut grass lost completely, or could this patch be taken later?
 - ii. What effects would leaving uncut patches have on the nutritional value of the resulting feed?
 - iii. What effect would leaving uncut patches have on subsequent cuts in that field?
 - iv. What effect would leaving uncut patches have on the overall quality of the ley in that field?
 - v. Could you describe costs by:
 - 1. The value of the uncut grass itself (use on farm or sell or mix?)
 - 2. Costs of having to buy more feed? (if that would be the case)
 - 3. Costs associated with making harvesting grass less efficient?
 - 4. Effects on the ley in the field?
 - 5. Effects on the soil quality of the field?
 - 6. Effects on silage or hay production process?
 - 7. Total cost? (can get back to me)
 - 8. How much these costs vary per year?
 - 9. Who costs fall upon – you or the contractor (if used)?
 - j. If agri-environmental schemes could compensate you for farm income lost, how much per ha should that be?
 - i. Would that amount ensure your farm does not lose income due to delayed cuts?
 - ii. Would you consider taking this option if it was available as an option in ELM?
 - iii. How much do you think you would need to offer for this to be picked up by farmers more widely in the Yorkshire Dales?
 - 1. Broadly speaking – ask what effect varying payment rates will likely have on uptake.
 - k. Would you prefer areas around nests to be patches, lines, or lines and margins?
 - i. Would it be feasible to ensure patches provide corridors to suitable uncut habitat?
 - l. What would be the yield and other impacts of leaving two inches off the ground when harvesting in fields you suspect Curlew and other waders are nesting in?
 - ii. Is it possible to quantify that per ha?
40. Do you have any other ideas how to deal with the risk grass-cutting poses for Curlew and other waders?
- a. If you were to design an AES scheme to protect Curlew from grass-cutting, how would you do it?

Permanent pasture management

41. Do you stock any permanent pasture at densities exceeding 1 sheep and lambs or 0.2 cows per acre between April to June?
42. How viable would it be to keep these stocking densities on any permanent pasture fields where Curlew nest from April through to June? (*ask in theory if no pasture-nesting Curlew*)
 - a. Roughly how many pairs of Curlew would be in the permanent pasture where it wasn't possible to avoid stocking above these densities during the relevant period?
 - b. What would be the knock-on effects of excluding livestock from Curlew-nesting pasture from early April to June on your farm?
 - c. What would be the financial implications of excluding from Curlew-nesting pasture from early April–June on your farm?
 - i. Is it possible to estimate these costs by field or ha?
 - d. If these costs could be compensated through ELM, would you choose that option?
43. Would you be able to produce a varied sward in your permanent pasture, with areas of taller vegetation and damp areas, wet flushes, or small, shallow pools?
44. Do you fertilise any permanent pasture between April and June?
 - a. If so, how?

Miscellaneous

45. Do interventions like we've discussed this oppose the culture of farming in the Dales?
46. Do you have any other ideas not discussed that you think could help Curlew on farmland?

Appendix 2

Table 6. Codes, name, and scheme for all CSHT, SFI, and capital item ELM options mentioned in this report.

Code	Name	Scheme
CGS20	Manage wet grassland for breeding waders	CSHT
CGS22	Manage priority habitat species-rich grassland	CSHT
CGS26	Manage grassland with very low inputs	CSHT
CLIG3	Manage grassland with very low nutrient inputs	SFI
CSAM3	Herbal leys	SFI
CSP11	Manage scrapes and gutters supplement	CSHT
CSP5	Shepherding supplement (non-moorland)	CSHT
CUP10	Limited livestock grazing on moorland	CSHT
CUP11	Shepherding livestock on moorland (no required stock removal period)	CSHT
CUP12	Shepherding livestock on moorland (remove stock for a minimum of four months)	CSHT
CUP13	Shepherding livestock on moorland (remove stock for a minimum of six months)	CSHT
CUP14	Shepherding livestock on moorland (remove stock for a minimum of eight months)	CSHT
CUP2	Manage rough grazing for birds	CSHT
CWT15	Manage ponds and bodies of water up to 2ha	CSHT
FG7	Anti-predator combination fencing	Capital item
FG8	Anti-predator temporary electric fencing	Capital item
GRH1	Manage rough grazing for birds	SFI
GRH2	Manage wet grassland for breeding waders	SFI
GRH5	Manage scrapes and gutters supplement (endorsed)	SFI
GRH6	Manage priority habitat species-rich grassland (endorsed)	SFI
UPL1	Moderate livestock grazing on moorland	SFI
UPL10	Shepherding livestock on moorland (remove stock for at least 8 months)	SFI
UPL2	Low livestock grazing on moorland	SFI
UPL3	Limited livestock grazing on moorland	SFI
UPL7	Shepherding livestock on moorland (no required stock removal period)	SFI
UPL8	Shepherding livestock on moorland (remove stock for at least 4 months)	SFI
UPL9	Shepherding livestock on moorland (remove stock for at least 6 months)	SFI
WBD1	Manage ponds	SFI
WBD2	Manage ditches	SFI
WN1	Grip blocking drainage channels	Capital item
WN2	Creation of scrapes and gutters	Capital item



Front cover: Curlew nest and fieldwork, by Paul Noyes / BTO; back cover: Curlew, by Rich Bunce Walking Photographer / BTO

Can upland agri-environment schemes in England support Curlew recovery? A review of current scheme options with farmer perspectives

This report assesses the extent to which the draft measures under the Environmental Land Management (ELM) policy will deliver a framework for Curlew conservation in England. The authors address key knowledge gaps, including: 1) the extent to which key interventions can deliver Curlew breeding requirements under existing ELM structure, 2) the extent to which farmers in a breeding Curlew stronghold (the Yorkshire Dales, UK) would be willing to engage with key interventions, and 3) the level of compensation that may be required for key interventions.

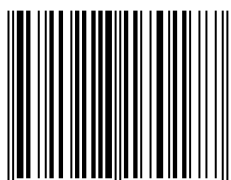
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