The case for the inclusion of predation management in ELMS alongside other special measures to support the recovery of declining farmland birds

Roger Draycott, PhD – Director of Advisory
Matt Goodall, MSc – Head of Education

January 2022

Who we are

This paper has been produced by the Game & Wildlife Conservation Trust (GWCT), a research and education charity that has published over 100 scientific papers in peer-reviewed journals on issues relating to predation control and the conservation of farmland and moorland birds over the past 50 years. On the basis of our scientific expertise and credibility, we regularly provide advice to such statutory bodies as Defra, Nature Scot, Natural Resources Wales and Natural England. We also provide practical advice to farmers, land managers and other conservation organisations on how to manage their land with a view to improving biodiversity. Our Advisory team have, for many years, run industry-leading best practice predation management training courses. These courses are based on practical experience backed up by GWCT science.

Summary

The case for the inclusion of predation management in ELMS alongside other special measures to support the recovery of declining farmland birds

- Many farmland birds and some mammals have declined significantly on farmland over the past 50 years.
- Habitat provision through agri-environment schemes can provide benefits for certain aspects of the lifecycle for a great many species. This includes attractive nesting habitat, foraging areas in summer and winter and provision of winter food resources in the 'hungry gap'.
- There is only limited evidence, at the local scale that habitat provision alone can recover declining species in the agricultural landscape.
- For many species, it is likely that a combination of active wildlife management measures will be required to bring about the national recovery of our precious farmland wildlife.
- We present evidence (scientific studies, demonstration projects and case studies) to show how effective predation management alongside habitat provision can be in restoring vulnerable farmland species.
- We are of the view that this approach would represent much better value for money for society than the current policy of only providing funding for some of the interventions that wildlife needs to recover. For example, currently, approximately £23 million per year are spent on agri-environment habitat options to support breeding waders on grassland yet numbers of breeding lapwings and curlews and other waders continue their worrying decline.
- We propose a set of funded standards to contribute towards the cost of predation management required to aid the recovery of priority species such as lapwing, curlew, and grey partridge.
- Applicants would only be eligible where there are priority species to protect, and where they are undertaking habitat management to aid the priority species' recovery.
- Applicants would be required to create a predation control management plan, ensuring their activities are planned, targeted and effective.
- Applicants would be required to undertake priority species population assessments annually and maintain records as part of their management plan.
- Applicants would undertake compulsory training relevant to the species they will be required to manage, ensuring the highest standards, best practice, and full awareness of all relevant legislation.
- Actions to protect priority species would include both non-lethal and lethal predation management. Applicants would be eligible to access a suite of actions dependent on their predation control management plan, which would be designed to reflect the protection requirements of the priority species they are aiming to recover.

1. Predation management as a conservation tool

1.1 Habitat improvement and species recovery

A great many declining or endangered species of wildlife are in such a parlous condition because of the loss of their habitat. Either the amount of their habitat or its quality have reduced. Nearly all conservationists agree that the answer to these problems and so the road to species recovery will be achieved through improvements to habitat.

The GWCT takes no exception to this response. In fact, the Trust's work on the management of arable crop edges (conservation headlands, beetle banks, extended field margins, wild bird seed covers) pioneered the provision of suitable habitats for nesting, wintering and chick-rearing habitats for wildlife on farmland, and the selective use of pesticides on arable land to support wildlife. These interventions are now embedded in UK agri-environment policy.

There are many examples of where the provision of habitat has halted the decline of a species and initiated recovery. For UK birds, we can cite bittern, cirl bunting, corncrake and many more where this has happened. But there are species where the provision of habitat alone has not halted declines or brought about recovery. Examples include grey partridge, brown hare, water vole, black grouse, lapwing and curlew.

1.2 Predation control alongside habitat improvement to aid species recovery

Through a number of scientific studies and well documented case studies, there is good evidence that the combination of habitat improvement alongside targeted, effective predation control can lead to the recovery of species of conservation concern where habitat improvement alone has failed.

The strongest evidence for these improvements following predator removal comes from large-scale, long-term, manipulative experiments whose findings have been published in peer-reviewed journals where predators are legally removed from an area and the responses of their prey monitored in comparison to areas of similar landscapes where predators remain. In the

pantheon of experimental approaches, these randomised, replicated removal experiments are considered the best way to identify the importance of predation. The GWCT has conducted three, and results are reported here. Academic ornithologists and other UK-based wildlife charities agree and have gone into print confirming this. They also agree that the experimental approach is more robust than the correlations of various datasets e.g. the correlation between increasing corvid numbers and declining songbird numbers. Statistically significant correlations do not indicate cause and effect can be caused by unmeasured factors. The absence of a significant correlation may indicate weak investigative methodologies. But manipulative experiments conducted by GWCT on Salisbury Plain and Otterburn, and the large-scale demonstrations at Royston, Loddington and elsewhere, provide this evidence.

1.3 Reducing predation pressure – not eliminating predation or predators

The GWCT does not believe that predation caused the decline of these species, although it may have contributed. But we do believe that predation is playing a role in preventing recovery even in the presence of sufficient quality habitat. We also believe that legal, often seasonal predation control, as prescribed by current wildlife and welfare laws, including the General Licences, is an important 'tool' in the conservation recovery 'toolbox' and that, for some species like curlew, every measure in this 'toolbox' should be deployed immediately to avoid the direst of consequences.

We face an uncertain future. The *State of Nature* report made depressing reading, with documented problems and species declines very apparent. With the consequences of climate change and post-Brexit support remaining uncertain, how should the conservation community, government, their statutory agencies and policymakers view predation control to halt species decline?

In most cases, to protect wild birds, predators are primarily removed during the breeding and pre-breeding periods (January to July). From a conservation of wild birds perspective, concentrating predation control during the breeding season seeks to reduce (not eliminate) losses of breeding birds and their eggs. We do not seek to eliminate predation – we can't – but

we can reduce it to ensure more birds breed successfully to produce fledged young. For example, at the GWCT's demonstration farm at Loddington in Leicestershire, we implemented a programme of predator removal to remove corvids to protect gamebirds and songbirds. Here, with predator control, we experienced 40% nest loss of wild pheasants. Without predator control, we experienced 80% loss. The difference meant that a population of wild birds could be built up over five years. There were still predation events, but not at a level that previously prevented population increase. Loddington was an 'island' of predator control surrounded by a 'sea' of foxes, crows and magpies. As the Loddington predators were removed, others moved in from outside the farm, across our farm boundary, but the disruption caused by the removal of our territorial predators early in the season and the inexperience of the incomers is thought to have provided a sufficient period of respite to allow their prey to breed more successfully.

An observation we make from our experiments and from the predator bag statistics that we collect in our National Gamebag Census scheme is that the annual take (or bag) of predators changes very little between years. This is often cited as a reason why predator control is not effective or a long-term, sustainable solution. We often hear that, "Surely predator control is not working if you have to kill the same numbers of predators each year?" The seasonal nature of predator removal provides the respite described above in which a window of opportunity to breed more successfully can be provided. Predators are removed but numbers fill back in after the breeding season. But during the breeding season, predator removal leads to more successful breeding of prey species.

Also, the current scale of removal can be balanced against the abundance of predators found across the country outside of areas where there is removal. There is, as yet, no detected impact of predator removal at a national scale. Most of our generalist predators, including the corvids and some birds of prey, are increasing in numbers or have stabilised after a period of increase. But we need to be vigilant.

The long-term impact of predator removal may become most apparent as the scale of removal increases, for example, where there are continuous blocks of land operating predator control as on the grouse moors of the North Pennines.

Many estates practising predation control collect bag data and submit it annually to the GWCT. Those that do not should be encouraged to do so, to demonstrate good stewardship of the land they manage. This could provide local early indications of problems if predator removal is having a negative impact on species.

1.4 The Scientific Evidence

The evidence base is international and not just found in populations of ground-nesting birds in the UK. Predation issues are a major concern for ground-nesting wader birds across Europe.

Key Reference: Macdonald M.A. & Bolton M. (2008) Predation on wader nests in Europe. *Ibis* 150: 54-73

1.4.1 Salisbury Plain – Wild grey partridge recovery

The GWCT's Salisbury Plain Experiment was a large-scale trial that studied whether legal predation control in spring and summer could improve breeding success and population growth for wild grey partridge. Predation control was carried out on one study area, while a second similar area nearby acted as a comparison without predation control. After three years, predation control switched from the first area to the second. The predators targeted were fox, stoat, weasel, rat, carrion crow, magpie, jackdaw and rook. The birds were removed under the General Licence.

This experiment showed unambiguously that controlling predators allowed 75% greater production of young. Despite shooting, this improvement carried over into successive years, so that spring breeding numbers increased by 35% each year and were 2.6 times greater after three years of predation control. Autumn numbers, before shooting began, were 3.5 times greater after three years. Clearly, this set of common predators was having a substantial impact on the local partridge population and controlling them from March to September relieved much of the pressure.

Key reference: Tapper, S.C., Potts, G.R. & Brockless, M.H. (1996). The effect of an experimental reduction in predation pressure on the breeding success and population density of grey partridges *Perdix perdix. The Journal of Applied Ecology,* 33: 965.

1.4.2 The Upland Predation Experiment at Otterburn – wader recovery

Twenty years later, the GWCT conducted a similar experiment on moorland in the north of England. The Upland Predation Experiment showed predation control led to benefits for breeding red grouse, but also curlew, lapwing, golden plover, black grouse, grey partridge and meadow pipit. With predation control, these wading birds were able to breed well enough for population growth, an important threshold that was not reached in the absence of predation control.

The effect on the curlew population was marked – in the absence of predation control, curlew numbers were dropping by 17% per year. When legal predation control was implemented, curlew numbers rose by 14% per year (after a lag period as the new chicks reached breeding age). We have calculated that the low breeding success seen in this experiment on moors where predators were not controlled could lead to a drop in lapwing and golden plover numbers of 81%, and curlew of 47%, over ten years. This prediction has not yet been tested, but studies have shown higher curlew density on keepered moorland.

Key reference: Fletcher, K., Aebischer, N.J., Baines, D., Foster, R. & Hoodless, A.N. (2010). Changes in breeding success and abundance of ground-nesting moorland birds in relation to the experimental deployment of legal predator control. *Journal of Applied Ecology,* 47: 263-272).

1.4.3 GWCT's Corvid Removal Study - songbirds

There is new scientific evidence that corvid removal positively impacts songbird populations locally. Previous national scale studies suggest that local effects have no impact on national population trends, with weak links between magpies and songbird populations. However, the new evidence strongly suggests that the national figures will mask local patterns. The evidence indicates that the ability to apply targeted corvid control at short notice can be beneficial, where

breeding hedgerow nesting and probably other songbirds are exposed to breeding corvids. The GWCT has published the results of a large field study over four years that looked specifically at the effect of corvid removal using, primarily, Larsen traps. The study applied randomised corvid control treatments to one plot in each of 16 pairs of study plots and documented nest success in hedgerow nesting passerines, using fledged brood counts and occupancy modelling. Overall songbird productivity was increased in the removal plots by on average 10% over the four years and by, on average, 16% in the three study years when it didn't rain heavily throughout spring (supressing both songbird and corvid productivity). While both crows and magpies were removed from study plots, the ecology of these two birds suggests that magpie control using Larsen traps was probably the main cause of the improved songbird breeding success documented in the study. Control reduced but did not eliminate magpies or crows from any of the 16 study sites.

Key Reference: Sage RB & Aebischer NJ (2017) Does best-practice crow Corvus corone and magpie *Pica pica* control on UK farmland improve nest success in hedgerow-nesting songbirds? A field experiment. *Wildlife Biology*. DOI: 10.2981/wlb.00375.

1.5 Other manipulations of predator abundance

The replicated, randomised removal experiments represented by work on Salisbury Plain, Otterburn and the Corvid Study are at the top of a 'quality' research methodology scale. Large-scale manipulations over large areas and over time are the next quality down. The GWCT has conducted or overseen many such studies.

1.5.1 GWCT Demonstration farm at Loddington, Leics (The Allerton Project)

This is the GWCT's first demonstration farm, set up in 1993. It represents 330ha of unexceptional land on heavy clay in Leicestershire. Between 1993 and 2001 we began a programme of management for wild game species and songbirds, which included habitat enhancement, winter feeding and legal, seasonal predator control using the General Licence to control corvids. In that time, we recovered songbird numbers to their 1960s levels. Also, in that time, a similar increase

was not observed in national breeding bird data. Additionally, our wheat yields matched national and regional figures. The increase in bird numbers was not caused by a de-intensification of farming; in fact, the reverse was true.

However, songbird increase was not thought to be attributed to predator control alone. What role did habitat and feeding play in this increase? To answer this, we removed predator control between 2001 and 2006 whilst maintaining habitat improvements and feeding. Over this time, songbird numbers fell and continued to fall when the feeders were also removed between 2006 and 2010.

During this period, we collected data on nest survival. For selected species, but not all, survival rates increased during periods when predators were controlled compared to periods when they were not (Table 1).

Table 1. Survival rates of songbirds during years with and without predation control

	With Predation Control	**Without Predation Control**	**% change**
Blackbird	25.7	8.9	+65
Songthrush	23.6	11.6	+50
Chaffinch	28.1	14.2	+50
Yellowhammer	32.3	16.9	+48

Key References:

White, P.J.C., Stoate, C., Szczur, J. & Norris, K. (2008). Investigating the effects of predator removal and habitat management on nest success and breeding population size of a farmland passerine: A case study. *Ibis,* 150: 178-190.

White, P.J.C., Stoate, C., Szczur, J. & Norris, K. (2014). Predator reduction with habitat management can improve songbird nest success. *Journal of Wildlife Management,* 78: 402-412.

Stoate, C., & Szczur, J. (2001). Could game management have a role in the conservation of farmland passerines? A case study from a Leicestershire Farm. *Bird Study,* 48: 292.

Stoate, C. & Szczur J. (2006). Potential influence of habitat and predation on local breeding success and population in Spotted Flycatchers *Muscicapa striata.* A short report. *Bird Study,* 53: 000-000.

1.5.2 Royston – a grey partridge recovery demonstration project

Between 2002 and 2008 we ran another demonstration of best practice management for grey partridges on several farms across the chalk ridge between Baldock and Royston. The principles were the same as those applied on Salisbury Plain, but at Royston there was no switch of keepered (with predation control) and unkeepered (without predation control) plots. On the keepered area, grey partridge densities increased from 2.9 pairs per km^2 in spring to 18.4 pairs. On the adjacent unkeepered area spring densities increased from 1.3 to 4.2 pairs. Keepered and unkeepered plots were adjacent so there was no barrier between the management areas. Again, corvids were controlled under the General Licence.

Key Reference:

Sotherton, N.W., Aebischer, N.J. & Ewald, J.A. (2014). Research into action: grey partridge conservation as a case study. *Journal of Applied Ecology,* 51: 1-5.

1.5.3 Arundel, Sussex

On private land in West Sussex, an estate owner has taken the management package devised by the GWCT to recover grey partridge numbers and implemented it on his farm The package includes predation control. The farm is one where the GWCT has been counting partridges since 1968 and has done so every year since then. At the start, grey partridge spring densities were high (up to 40 pairs per km^2), but by 2003 numbers had fallen to three birds! At this point the tenancy ended, the land came back in hand and the management began.

Population recovery was spectacular, increasing to nearly 90 pairs across the farm (or from 6.3 pairs per km^2 in 2003 to 19.1 pairs in 2015). On other parts of the study area without this management, numbers varied between 0.8 and 2.4 pairs per km^2. Autumn densities at Arundel increased from 1.1 to 140.6 birds per km^2. Songbird numbers have also increased, but this work has not been reported in the scientific journals. But it does represent what is happening on many private estates aided by effective predation management alongside habitat management.

Key Reference: Aebischer, N.J., Ewald, J.A., & Kingdon, N.G. (2018). Working towards the recovery of a declining quarry species: the grey partridge in the UK. In: Baxter, GS, Finch, NA & Murray, PJ (eds) *Advances in Conservation Through Sustainable Use of Wildlife:* 55-62. Wildlife Science Unit, University of Queensland, Gatton, Australia.

1.5.4 Curlew breeding success in relation to grouse moor proximity: estimating abundance and breeding success using behavioural data

The breeding population of Eurasian curlew (hereafter 'curlew') is declining across almost all its range, with estimates suggesting a 20 to 30% decline in the last 15 years. For this reason, the IUCN classifies curlew as 'Globally Near Threatened' on its Red List of Threatened Species. The UK population represents about a quarter of the global breeding population, but here it is estimated that the breeding population halved in the last 25 years. Accordingly, it is considered the bird of greatest conservation concern, with high UK decline rates having a greater adverse impact on the global population than those of any other country.

Poor breeding success, often attributable to predation, typically by foxes, stoats, crows and gulls, is a mechanism for decline. In Europe over half of published studies quote less than the 0.5-0.6 fledglings per pair per year required to offset adult mortality and to maintain a stable population. Declines appear less in some upland parts of northern England and Scotland where driven grouse shooting is a major land use and both habitat, and generalist predators are managed. This link between grouse moor management and sustained numbers of breeding curlew was established by the GWCT's Upland Predation Experiment at Otterburn in northern England (2000-08) (see

above). Here predation control led to a three-fold increase in the breeding success of curlew and other waders and annual increases in breeding numbers.

It is evident that managers of driven grouse moors have a pivotal role in conserving curlew in the UK and hence globally, but this link, whilst weakly acknowledged by the RSPB and statutory conservation bodies, is also massively played down by them. To that end, in 2016 the GWCT started a three-year project to quantify curlew breeding success on or adjacent to a range of keepered and non-keepered moorland edges to determine whether results from the Otterburn experiment were representative of those from wider moorland in the UK.

Study sites were paired, with one site on the fringes of moorland managed for driven red grouse shooting, and thereby receiving active predator management, the other on equivalent habitat type without adjacent grouse shooting and keepering. Eighteen paired sites were selected across most upland regions in the UK, including North Wales (Berwyn), northern England (Bowland, Yorkshire Dales, North Pennines, North York Moors and Northumberland), the Scottish Borders (Lammermuirs, Southern Uplands) and the Scottish Highlands (Perthshire, Strathspey and Morayshire). Pairs of sites were each surveyed in one breeding season during the three-year period (2016-18). Sites were sufficiently large (approx. 1.5-4.0 km^2) to yield a breeding success estimate based on at least 10 pairs of curlews.

To produce estimates of the number of breeding pairs of curlew and their breeding success, each site was surveyed five times spread between mid-April and early July. Curlew were classed as having chicks if they alarm called vociferously and persistently. Conversely, adults lacking such behaviour and readily flying off when disturbed were classed as not having chicks. These parameters were also recorded for other waders, mainly golden plover and lapwing, but also redshank, snipe, oystercatcher, ringed plover and greenshank.

On unkeepered plots, curlew pairs were approximately half as numerous as on keepered plots. Expression of aggressive behaviour by adult breeding curlew and the time period in weeks over which this behaviour was exhibited suggest that the proportion of curlew pairs fledging one or more chicks was almost four times higher on grouse moor fringes (0.67) than away from grouse moor fringes (0.17). This difference was consistent between regions and years and, of the 18

paired sites, breeding success was higher amongst the keepered sites at 17 of the pairs of sites and similar to the unkeepered site at only one of the pairs. At no pair of sites was breeding success higher where predators were not managed. Assuming curlew need to rear an average of 0.6 chicks per pair to off-set adult mortality and maintain stable numbers, then this was achieved at a minimum of 14 of the 18 (78%) keepered sites, but at none of the 18 unkeepered sites. These rates assume that only one chick was reared per pair, but curlew can successfully rear up to four chicks, and these provisional rates will be corrected upwards using estimates of brood size at fledging during final analyses.

By looking at curlew behaviour in relation to the timing of each of the five surveys at each site, the data suggest that greatest losses occur during incubation and that an index of carrion crow abundance was negatively associated with breeding success. This suggests that clutch predation by carrion crows could be the primary cause of poor breeding, especially at sites where corvids are not routinely controlled. Breeding success may also vary between habitat types, but provisional analyses suggest that whilst sites overall differed in habitat, those within each pair of sites did not. Hence, differences in curlew breeding success in relation to corvid abundance were consistent across habitats and regions of the UK. Final analyses will include patterns of abundance and breeding success of the other wader species. To date, these reflect those of curlew, with higher numbers and better breeding success on sites where predators are managed by gamekeepers. These results closely support those from the ten-year experiment at Otterburn, suggesting that those findings are representative of what is happening across the wider UK uplands.

Key reference:

Baines, D. (In prep) Predator management on UK grouse moors predicts breeding success of Curlew, a globally near-threatened wader.

2. Are existing agri environment scheme options sufficient to drive wader recovery?

2.1 Fallow plots on arable land to support ground nesting waders

The main government-funded delivery mechanisms for reversing the declines in farmland bird populations are agri-environment schemes (AES). On arable land, the main AES option available in England to benefit lapwings is the fallow plot for ground-nesting birds. This option originally arose out of a successful project to increase stone curlew populations in England and observations that lapwings also nested on these plots. Lapwing plots were funded through Higher Level Stewardship and Entry Level Stewardship option and are currently funded through Countryside Stewardship. Land managers are required to create fallow (un-cropped) plots of 1 or 2 ha in arable fields by cultivating in spring. These options are designed to provide both nesting and foraging opportunities for lapwings.

The efficacy of these plots was evaluated in a Defra study (Defra Research Report on Project BD5211). The overall aim of the project was to assess the efficacy of AES fallow plots as a tool for lapwing population recovery in lowland arable and mixed farming landscapes, as compared to conventional crops available to lapwings in the landscape.

Productivity was estimated for a total of 262 lapwing pairs on fallow plots and 160 pairs on spring crop fields. Overall proportions of pairs fledging a brood were 24.8% and 16.3% on fallow plots and spring crops respectively. The overall mean number of young fledged per pair was 0.47 on fallow plots and 0.32 on spring crops. The results of the two years of this study indicate that fledging rates of lapwings on fallow plots were not sufficient to maintain a stable population (0.7 young fledged per pair is required); nor were they significantly higher than those on alternative breeding habitat in the arable landscape. The key reason for failure of lapwings to fledge broods was predation of nests and chicks.

2.2 Do lapwing plots funded through agri-environment represent good value for money?

Fallow plots are an expensive AES option (£360/ha under Environmental Stewardship and now £566/ha under Countryside Stewardship). It has been estimated that the annual cost of agri-environment funding for nesting plots for ground nesting birds is £2.2 million (Rayment 2017)

yet the research demonstrates that this option, in the absence of other measures including (predation control) does not lead to an increase in productivity.

Key References:

Hoodless, A.N. & MacDonald, M. (2014). Lapwings on agri-environment scheme fallow plots: research to improve lapwing breeding success. Defra Research Report on Project BD5211

Rayment, M (2017) assessing the costs of environmental land management in the UK. Report for RSPB, the National Trust and the Wildlife Trusts.

2.3 Encouraging breeding waders in lowland pastoral landscapes

Outside of nature reserves, in the wider farmed landscape, there is limited evidence that habitat prescriptions alone, funded through agri-environment can lead to significant recovery of wader populations. Currently, approximately £23 million per year are spent on agri-environment options to support breeding waders on grassland (Rayment 2017). To illustrate the point, in Shropshire, curlews continue to suffer high predation rates despite widespread uptake of grassland agri-environment options in the area:

2.3.1 Curlew Country, Shropshire

In 2015 and 2016, Curlew Country, the Curlew recovery initiative, based on the Shropshire/Welsh borders monitored a total of 30 nests to find the cause of curlew breeding failure in a significant local population. A combination of nest cameras, data loggers and physical monitoring was used. In each year only three nests got beyond egg stage to produce chicks. All chicks were subsequently lost. Over 50% of predation events at egg stage were by foxes and just under 25% by badgers. Other failure was due to a range of causes including predation by crows. Radio tracking of chicks in both years and in 2017 returned limited data on predator type, but tags were found showing evidence of fox and avian predation. Anecdotal evidence suggested that had

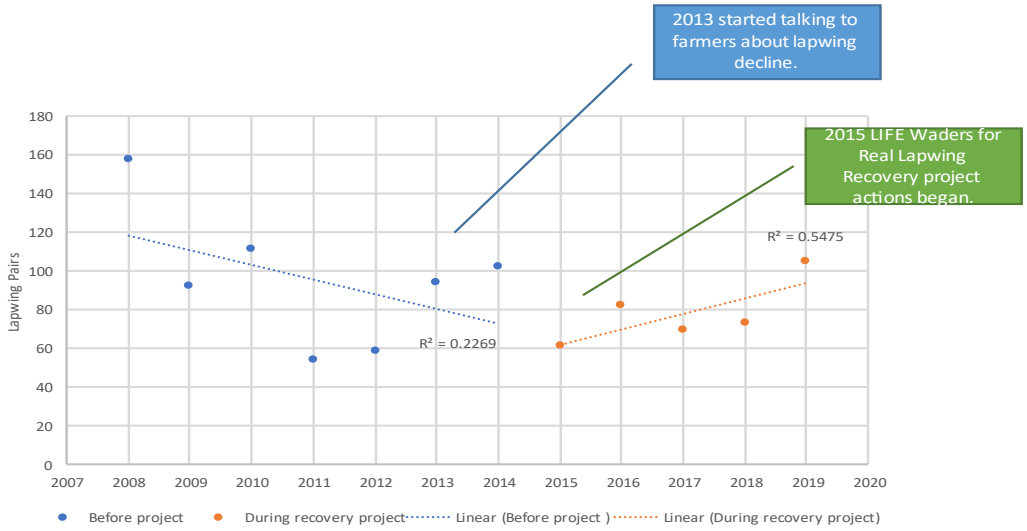
nests not been predated they would have been accidentally disturbed or destroyed by agricultural operations subsequently.

In 2017, Curlew Country trialled some predation control focused primarily around three nests, combined with farmer payments for crop sacrifice. Recruitment of chicks to the local breeding population is difficult to measure without physical observation of their departure and identification upon their return. Anecdotal evidence suggests three chicks fully fledged from the three nests protected against predation and agricultural disturbance. Hence, in this part of Shropshire, it would seem very unlikely that focussing on habitat prescriptions alone would lead to the recovery of curlew.

2.3.2 Wader recovery in the Avon Valley Habitat management and predation management

There has been a long term decline in the breeding wader population of the Avon Valley, this is despite significant effort by farmers improving habitat through agri-environment schemes since the mid 2000s. The Avon Valley is a river floodplain of high biodiversity interest, part of which is designated as a SPA. Numbers of breeding waders in the Avon Valley, in common with other lowland river valleys and wet grasslands, have declined dramatically since the 1980s, with declines of 66% in lapwing *Vanellus vanellus* pairs, 81% in redshank *Tringa totanus* pairs and 97% in numbers of displaying snipe *Gallinago gallinago* between 1990 and 2010. Monitoring of lapwing breeding success in the Avon Valley by the GWCT during 2007-2014, showed that the number of chicks fledged was too low to maintain a stable breeding population. To halt the decline of lapwing and redshank urgent intervention was required to improve breeding success. Since the formation of a farmer cluster, where farmers and gamekeepers are collaborating to improve habitat and undertake targeted landscape-scale predation control, numbers of lapwings are now increasing (Figure 1). Before the project began, lapwing on the Bisterne water meadows averaged 0.49 chicks/pair. During the project they have exceeded the 0.7 threshold for a sustainable population, averaging 0.82 chicks per pair.

Figure 1. recovery of breeding lapwings in the Avon Valley, Hampshire, through a combination of habitat improvement and predation control



2.3.3 Elmley NNR – Lapwing conservation through habitat improvement and predation control

Elmley NNR has been managed for wildlife with a focus on breeding waders since 1993. Five components of conservation management were identified as crucial to achieve satisfactory chick productivity for breeding waders at Elmley NNR:

1) The tightly controlled livestock-grazing management necessary to create and maintain the optimum heterogeneous grassland sward required by the breeding waders from March into June, coupled with the essential ability to add or remove livestock at will from wader breeding areas during this period.
2) The availability and control of water in order to produce shallow pools and extensive drying muddy rill margins, necessary as feeding areas for the wader chicks.

3) The rills and/or foot drains, either natural or artificially created, that provide the ideal micro- topography. This variation in soil surface height across each field is vital for increasing and maintaining a heterogeneous mosaic of wet and dry areas and ensuring that waterbodies remain damp through the wader breeding season. This ensures that, throughout the drying period of late spring, there are always areas which are in optimum condition for invertebrates and invertebrate diversity, the staple food source for wader chicks
4) The slowed grass growth in spring resulting from the artificial winter waterlogging caused by creating the habitat for wintering birds, coupled with the absence of fertiliser application.
5) A greatly reduced predator impact through effective legal, lethal control measures, habitat manipulation and physical barriers.

Since that time, these five components of conservation management have formed the foundation of breeding wader management at Elmley NNR.

Between 2010 and 2018 independent field workers were commissioned to:

(a) monitor the number of adult pairs
(b) monitor the number of fledged chicks
(c) assess the factors (components of conservation management) influencing chick productivity.

Over the nine years of this research programme, 3,560 pairs of adult Lapwings and 3,569 fledged chicks have been monitored and recorded. During this same period, the relevant components of conservation management (1 - 5 above) have been assessed and recorded by the same field workers. The key conclusion reached from Elmley are, that in order to fledge a population-sustaining number of chicks (approx. 0.7 fledged chicks per adult pair per

year), **each** and **every** component of conservation management (1 - 5 above) has to be in place. It is clear from Elmley that a failure to do this will severely compromise chick productivity.

3. Special Measures for the recovery of priority species

In this section, we describe how predation management could be incorporated into ELMs through a package 'of special measures' that include reducing pressure on breeding birds alongside effective habitat provision. The set of standards below focus on predation management with the intention that they would sit alongside existing or new habitat options. We have written the text in a similar format to the existing SFI standards, designed as instructions/requirements for the land manager. These standards could function within the SFI, the Local Nature Recovery Scheme or Landscape Recovery.

3.1 How the standard works

This standard has a set of actions you must complete, where relevant, to get paid.

If you're already doing activities on your land that fulfil the actions in this standard, they can be used towards completing the action. This means you can maintain existing activates to complete actions that require you to 'create' or 'establish' something.

Anything you're doing to complete an action only counts towards that action. It will not count towards the standard's other actions, unless this guidance says otherwise.

3.2 When to complete actions

Because agreements will start from [insert month] 2022 at the earliest, it will be too late to complete some actions that must take place seasonally - for example, the Corvid Control Action should begin between January and March.

Complete these actions within 12 months of your agreement start date. As an example, this means you can complete the Corvid Control Action activities in late Winter/ Spring 2023.

Actions that you need to complete within the predation management standard will be seasonal - for example, undertaking the Corvid Control Action. You should complete these actions within 12 months of your agreement start date.

3.3 How much you'll be paid

You'll be paid £3 per hectare of land you enter in the standard.

You'll be paid for all the eligible land that's in your agreement, and you'll have to complete the actions on all that land.

This payment rate is annual.

You'll also get additional payments for completing the actions - the amounts are listed with the actions.

You can apply for funding for capital items dependant on the action your activities complete. For example, Larsen traps can be paid for as a capital item under the Corvid Control Action.

3.4 What land is eligible

- This standard is only available in combination with land management options targeted at priority species recovery which benefit from predation control [see Appendix 2 for an example of priority species] where either:

- at least one priority species is present on the site

- you can manage the site to create the right conditions to allow the reintroduction, re-colonisation, or range extension of a named priority species.

As an example, the Corvid Control Action could be tied with AB5 Nesting plots for lapwing (and in Higher Tier, stone curlew). [See Appendix 3 for an example of management options which this standard could be linked to].

The predation management work must have written support from a specialist.

You can only use this option if it meets the relevant criteria (see below), you have written approval from RPA and it supports the management for priority species. [There should be flexibility for predation management payments to help species which breed in conventional crops. For example, on chalk downland, Lapwing will often nest in spring cereals, and in East Anglia, Curlew breed in sugar beet. The applicant would need to provide evidence of prior nesting attempts in such areas on their holding].

3.5 Ineligible land

This standard cannot be used on land which has no management option tied to the recovery of any priority species which benefits from predation control, or land outside a Priority Species recovery area/zone.

3.6 Sites of special scientific interest (SSSIs)

If your application includes SSSI land, you will need consent from Natural England.

Make your request for consent when you get your agreement offer. Send a copy of the offer along with a notice form to:

ProtectedSites@naturalengland.org.uk

Your agreement cannot start without SSSI consent.

For more information read the guidance Sites of special scientific interest: managing your land

3.7 Actions

You must do the following actions:

3.7.1 Complete a predation control management plan

This action will increase your knowledge of your threatened species and predation control which benefits them. The plan will inform future management to protect your priority species. The plan must be signed off by a specialist.

You only need to complete a predation control management plan once in the first year of your agreement. You'll get a one-off extra payment of £200.

The predation control management plan will need updating annually to update population estimates and to record cull data.

You must complete the assessment for all species entered in the Predation Management standard. Each priority species will need an estimate baseline population, an associated habitat improvement project and a predation control strategy.

3.7.2 Required documents

You must keep your predation control management plan. You do not need to send this to us unless we ask for it.

3.7.3 Information on predation control management plans

How you complete this action is up to you, however it must be signed off by a specialist. You can read information on how to complete a predation control management plan [insert link here].

You should keep a copy of your predation control management plan.

3.7.4 Attend a suite of predation control training courses

The courses cover different facets of predation control such as:

- Law and legislation
- Best Practice and codes of practice
- Non-lethal predator exclusion best practice
- Fox control best practice
- Corvid control best practice
- Mink control best practice
- Small mustelid, rat, and grey squirrel control best practice

Dependant on your predation control management plan, you will be required to attend mandatory training courses for the measures you intend to employ. Some courses will need to be attended annually. You are required to attend the mandatory training in the first year of your agreement.

You'll get an extra payment of £100 for each course you are required to attend.

The courses will be available from [insert month] when your agreement goes live. Due to Covid restrictions your course may need to be held as a webinar.

3.7.5 Required documents

You must keep your confirmation of attendance at the course. You do not need to send this to us unless we ask for it.

3.7.6 Information on predation control training courses

Which course or courses you need to attend will be determined by your predation control management plan. You can read information on predation control courses [insert link to training courses]

3.7.7 Optional actions

You must select at least one of the following optional actions to meet the criteria set within your predation control management plan.

3.7.8 Predator Exclusion

Install predator exclusion fencing as outlined in your predation control management plan whilst adhering to the standards outlined during your training. You are required to undertake the relevant training course to meet the criteria.

You'll get an extra £225 per 100 metres of fencing installed and maintained.

You can apply for capital items including electric fencing items.

3.7.9 Required documents

You must keep photographic records of your predator exclusion fencing. You must keep your confirmation of attendance at the associated course. You do not need to send this to us unless we ask for it.

3.7.10 Information on predator exclusion

Which type of predator exclusion fence you need will be determined by your predation control management plan. You can read information on predator exclusion fences [insert link to Best Practice Guide]

3.7.11 Corvid predation control

Undertake a corvid control programme to reduce predation pressure from corvids during the nesting season, whilst adhering to all relevant legislation and the standards outlined during your training. You are required to undertake the relevant training course to meet the criteria.

You'll get an extra £610 per 50ha included within this option and are required to employ a minimum of one Larsen cage trap per 50ha between 1st March and 30th June. The minimum area to be covered under this option is the whole farm.

You can apply for capital items including Corvid cage traps approved under the relevant General Licences.

3.7.12 Required documents

You must keep daily records of your corvid control programme and adhere to the recording requirements set out in your training course. You must keep your confirmation of attendance at the associated course. You do not need to send this to us unless we ask for it.

3.7.13 Information on Corvid control best practice

You can read information on Corvid control best [insert link to Best Practice Guide].

3.7.14 Fox predation control

Undertake a fox control programme to reduce predation pressure from foxes during the nesting season, whilst adhering to all relevant legislation and the standards outlined during your training. You are required to undertake the relevant training course to meet the criteria.

You'll get an extra £27 per hectare for including this option up to a total of £2,700. You are required to include the whole farm to meet the criteria. Control should take place over a minimum of 30 weeks between 1st December and 31st July.

You can apply for capital items including high seats.

3.7.15 Required documents

You must keep daily records of your time spent completing your fox control programme and adhere to the recording requirements set out in your training course. You must keep your confirmation of attendance at the associated course. You do not need to send this to us unless we ask for it.

3.7.16 Information on fox control best practice

You can read information on fox control best practice [insert link to Best Practice Guide].

3.7.17 Small mammal predation control

Undertake a small mammal control programme to reduce predation pressure from stoats, weasels, mink, rats and squirrels during the nesting season, whilst adhering to all relevant legislation and the standards outlined during your training. You are required to undertake the relevant training course to meet the criteria.

You'll get an extra £500 per 50ha included within this option. You are required to employ a minimum of five live-capture or lethal spring traps per 50ha. A minimum effort of ten weeks is required between 1st March and 30th June. The minimum area to be covered under this option is the whole farm.

You can apply for capital items including relevant spring traps.

3.7.18 Required documents

You must keep daily records of your time spent completing your small mammal control programme and adhere to the recording requirements set out in your training course. You must keep your confirmation of attendance at the associated course. You do not need to send this to us unless we ask for it.

3.7.19 Information on small mammal control best practice

You can read information on small mammal control best practice [insert link to Best Practice Guide].

These headings follow the above content in the standards but offer no standard specific guidance.

1. Further advice and information – Would contain links to Best Practice Guides
2. Funding for capital items – Would include required resources such as electric fencing, Larsen traps, high seats, and Spring traps as examples.
3. Monitoring and support
4. Additional standards you can apply to this land
5. Further information

4. A non-exhaustive list of priority species (BoCC species) which benefit from predation control:

Grey partridge
Black grouse
Turtle dove
Lapwing

Curlew
Skylark
Yellowhammer
Stone-curlew
Redshank
Song thrush

5. A non-exhaustive list containing examples of current habitat options targeted at priority species recovery, which a predation management standard should be linked with:

AB4: Skylark plots
AB5: Nesting plots for lapwing and stone curlew
AB9: Winter bird food
AB12: Supplementary winter feeding for farmland birds
AB16: Autumn sown bumblebird mix
GS5: Permanent grassland with very low inputs in SDAs
SP9: Threatened species supplement
UP2: Management of rough grazing for birds