Action for Birds in England

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Abstract

Natural England and the RSPB have collaborated on species-focused conservation projects for several decades. Since 2005, this has been through a formal ‘Action for Birds in England’ partnership programme. Here, we review the conservation delivered through this partnership and assess the progress achieved and lessons learnt for the nearly 50 species of bird targeted. We

show that around 70% of research and recovery projects either partially or completely achieved their goals. There have been notable successes for some species, such as the Red Kite *Milvus milvus* and the Cirl Bunting *Emberiza cirlus*, but other species, notably more widespread and more abundant species, have so far failed to recover. We conclude that the scale of investment in conservation action needs to be makedly increased if we are to successfully address the biodiversity crisis in England.

Introduction

The loss of nature on a global level has been well documented (e.g. IPBES 2019). In the UK and its constituent countries, monitoring of birds through schemes such as the BTO/JNCC/RSPB Breeding Bird Survey (BBS) and national surveys of rarer species have provided an especially clear picture of the pattern, scale and speed of this loss in birds. For example, the UK farmland bird indicator has declined by 60% and the woodland indicator by 37% between 1970 and 2022 (JNCC 2023), and the number of species on the Red list of *Birds of Conservation Concern* has risen from 36 in 1996 (Gibbons *et al.* 1996) to 70 in 2021 (Stanbury *et al*. 2021). Seven bird species, including the once-widespread Wryneck *Jynx torquilla*, have been lost as UK breeders in the last 50 years, and there is a long and growing list of species for which this is a realistic future prospect. A recent assessment of extinction risk in Britain (Stanbury *et al*. 2021) listed 21 bird species as Critically Endangered.

The drivers of this biodiversity loss are often well know, although the detailed mechanisms by which they influence trends are well understood for only a few habitats and species. An attempt to quantify the relative importance of the broad drivers of change in the UK's biodiversity (Burns *et al*.

2016) identified the following factors as the most significant, in descending order of impact: intensive management of farmland, climate change, hydrological change, low-intensity management of agricultural land and urbanisation.

The need to halt and reverse global biodiversity loss has been underlined by the Conference of the Parties (COP) to the UN Convention on Biological Diversity, with the recent adoption of the Kunming-Montreal Global Biodiversity Framework (GBF), which commits 188 countries to 23 action targets to be met by 2030, along with four goals for 2050. Among the goals are: 'Human-induced extinction of known threatened species is halted, and, by 2050, extinction rate and risk of all species are reduced tenfold, and the abundance of native wild species is increased to healthy and resilient levels.'

In response, the UK's six nature conservation agencies (JNCC, Natural England (NE), Natural Resources Wales, NatureScot, Council for Nature and the Countryside (Northern Ireland) and DAERA (NI)) have committed to meeting the GBF targets. National biodiversity targets are being set by the devolved governments and delivery frameworks developed. In England, the Environmental Improvement Plan 2023 was the first revision of the 25-Year Environment Plan, published in 2018, and has an 'apex goal' of halting the decline in species abundance by 2030. Additionally, the government has adopted two further, longer-term and legally binding species-based targets: to increase the abundance of species by 10% (above 2022 levels) and to improve the GB Red List Index for species extinction in England (compared to 2022 levels) by 2042.

45. Black-tailed Godwit *Limosa limosa*, Norfolk, August 2006.

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An effective response to the biodiversity crisis requires action at scale, embedded in all areas of governmental decision-making and civil society. At its heart, this response requires a more sustainable approach to the use of the earth's resources, but this goal must be allied with action to mitigate specific threats to enable nature's recovery. There is evidence that broad-brush approaches to conservation, while necessary to deliver environmental recovery at scale, might fail to deliver the requirements of individual

threatened species. Many of our most threatened species are specialists, with narrow requirements in terms of certain resources, such as nesting habitat, food and climate space. Without bespoke conservation action to ensure specific niches are retained, these species may be lost (Webb *et al*. 2009). In addition, conservation translocation, including reintroductions of species lost from their native range (Webb *et al*. 2009), is a well-established conservation intervention in circumstances in which the original cause(s) of loss have been correctly identified and removed or sufficiently reduced. In response, Species Recovery Projects (SRPs) have become an established component of the conservation response to the biodiversity crisis, enabling the structured, managed delivery of actions to help single or, sometimes, a suite of species that share common drivers of decline/ecological needs. Such projects should be embedded within wider, landscape-scale delivery approaches to ensure that the needs of individual threatened species are not overlooked within large-scale ecosystem restoration initiatives.

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Box 1.

Assessing progress: the species recovery curve

In recent years, both NE and the RSPB have developed the 'species recovery curve' as a framework to manage and assess progress of species recovery projects. The RSPB version (fig. 1) presents recovery as a series of four stages, each subdivided into three to allow finer-grain measurement of progress:

Diagnosis (D1, D2, D3):

determining the causes of poor conservation status, usually through research.

Trial management (T1, T2, T3):

the development and testing of practical management solutions.

Recovery management (R1, R2, R3):

the deployment of solutions and evaluation of species response, allowing for further development and fine-tuning of the management approach.

Sustainable management (S1, S2, S3):

population maintained within regular land or marine management practices and requiring little or no specific conservation intervention.

The curve shows a hypothetical population trajectory of a species as its population recovers, including ongoing decline during the early stages before recovery action is deployed at sufficient scale to influence the population. Crucially, this enables progress (or lack of) to be formally assessed before a species' response can be expected, such as whether diagnostic research is making headway in identifying the causes of decline and then proposing potential workable conservation solutions. Importantly, monitoring should run alongside assessment. The sequential nature of the stages of the curve is a simplification – for example, the need for urgent action might mean that trial management or even widespread recovery management is deployed for some species while diagnostic research is still ongoing.

For some species, it may not be possible to achieve a sustainable end point without specific ongoing conservation requirements, so for that reason the recovery curve defines three end points – one being

Sustainable Recovery

and the other options being

Policy Dependent

, meaning that the necessary wide-scale land and/or marine use need to be supported by a government policy framework, and

Conservation Dependent

, in which ongoing site or landscape management is required to support the species.

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Achieving recovery for a species can be conceptualised as a ‘recovery curve’ (box 1; fig. 1) with different actions contributing at different stages. Often referred to as a ‘conservation toolkit’, species recovery actions typically include:

- ## One-off and periodic surveys

  , to establish the current status of individual species of concern not otherwise included in existing monitoring schemes and to evaluate the effectiveness of conservation interventions.

- ## Research

  , to diagnose the causes of species decline and identify factors limiting the population, to enable the development of solutions to aid their recovery (which typically require trialling at small scale before being applied to a larger proportion of the population). This may continue through the life of SRPs, informing the delivery of conservation actions, and enabling them to be fine-tuned.

- ## Direct intervention

  , such as bespoke, intensive, local management actions to support the recovery of rapidly declining species; e.g. the initial provision of winter food for Cirl Bunting *Emberiza cirlus*.

- ## Translocation

  , for instances where a species has disappeared from a significant part of its native range, is unlikely to recover naturally, and conditions are now suitable for a viable population to be re-established; e.g. Red Kite *Milvus milvus*.

- ## Species protection

  , to prevent illegal persecution or disturbance, usually at local breeding sites of rare species; e.g. Montagu's Harrier *Circus pygargus*.

- ## Policy advocacy

  , such as identifying and advocating for changes in national or local

policies to support nature conservation for the benefit of the wider environment and people, as well as for specific species; e.g. development of agri-environment schemes to deliver nature-friendly management of farmland.

- ## Nature reserve acquisition and management

  , which protect and improve the status of key sites for priority species and habitats, including the creation of new habitats; e.g. reedbeds for Eurasian Bitterns *Botaurus stellaris*.

- ## Site protection

  , including identifying important sites for priority species and ensuring they are fully protected and managed in line with national and international law.

- ## Landscape-scale habitat restoration

  , which is often based around existing reserves and/or protected areas to enlarge and link them and to improve management in the surrounding buffer area. This could include ‘rewilding’ projects as well as the targeted creation or restoration of semi-natural habitats.

- ## Conservation advice

  , such as providing advice and guidance to support the delivery of species conservation; e.g. helping farmers access agri-environment schemes to protect Eurasian Stone-curlew *Burhinus oedicnemus*.

- Finally,

Continuation of species monitoring

to determine the success or otherwise of these interventions.

Action for Birds in England

Conservation organisations have long tended to lament the parlous state of individual bird species and report the success, or otherwise, of their conservation interventions. We have more recently become better at providing an overview of the state of biodiversity, through indicators and overarching reports such as the State of the UK's Birds (e.g. Burns et al. 2020) and the State of Nature (e.g. Burns et al. 2023). Though much of our recovery work involves programmes of work on multiple species and is prioritised, planned, funded and executed by partnerships involving two or more partner organisations, this way of working and its many positives remains rather poorly communicated. The aim of this paper is to describe and review the species-focused research and conservation action delivered through a long-standing partnership programme between RSPB and NE (and its predecessor, English Nature). The focus is on birds, though both organisations promote the conservation of a wide range of taxa through partnerships with groups and organisations with complementary expertise. The partnership with the RSPB, and this paper, focuses on England, reflecting NE's geographical remit, even though the RSPB leads similar projects in the rest of the UK and internationally, in some cases for the same species (e.g. Red Kite and Corn Bunting *E. calandra* in Scotland).

The partnership extends back to the formation of separate statutory bodies

with responsibility for conservation in England, Scotland and Wales upon the dissolution of the Nature Conservancy Council (NCC) in 1991, and the formation of the JNCC to coordinate nature conservation between the three country agencies and their equivalent in Northern Ireland. NCC and RSPB were working together on, for example, the translocation of Red Kites in England and Scotland before 1991, and the collaboration with NE and the former Scottish Natural Heritage continued. In recognition of the value of the partnership in England, a formal relationship was launched in 2005 under the banner of 'Action for Birds in England' (AfBiE). This allowed a more strategic approach to planning, identifying priorities and providing increased security of funding. The vast bulk of NE's funding for AfBiE has come from its long-running and much celebrated Species Recovery Programme, set up as far back as 1991 to take targeted recovery action for England's most threatened species of all taxa.

AfBiE is governed by a steering group, which meets quarterly to assess ongoing projects and future priorities. Although NE staff contribute considerable time and expertise, projects are managed by the RSPB with the two organisations sharing the costs; many projects have involved other organisations in the operational delivery. Other funders are sometimes involved, including governmental and other public bodies, such as other statutory conservation agencies and the Forestry Commission, along with other NGOs and grant-awarding bodies, including the Heritage Lottery Fund and EU-LIFE.

Between the start of AfBiE in 2005/06, approximately J17 million (adjusted to 2021/22 prices) has been spent through AfBiE. Funding has varied over the period of the agreement (fig. 2), reflecting variation in government and RSPB investment. More broadly, public sector investment in biodiversity in the UK

rose in 2000/01 to peak in 2008/09 and 2013/14 (investment at the peak was J757 million per annum in 2022 terms) before falling (fig. 3)). It has, however, risen annually between 2016/17 and 2020/21, although remains at just 0.03% of GDP (JNCC report) It is notable that while public sector investment dipped markedly over the last decade, that by non-governmental organisations rose steadily over the same period, although this uplift did not fill the gap left by reduced government investment.

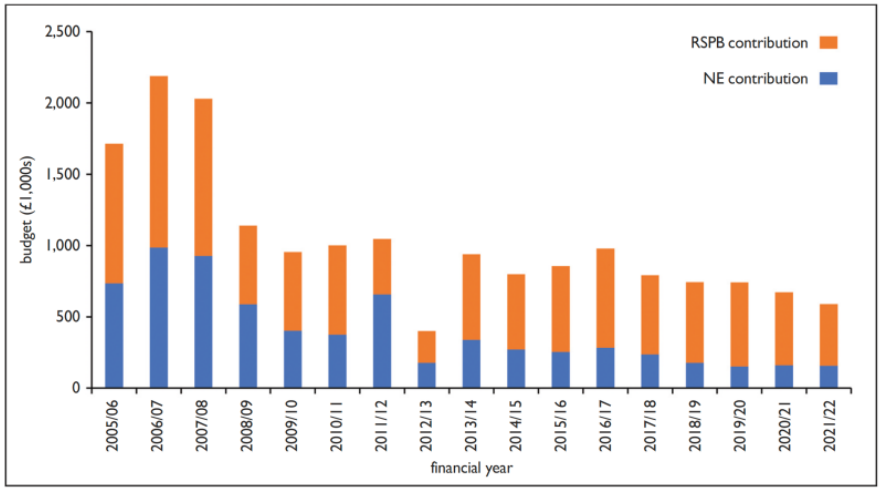

Fig. 2. Partnership investment in AfBiE, 2005/06 to 2021/22, adjusted to 2021/22 prices.

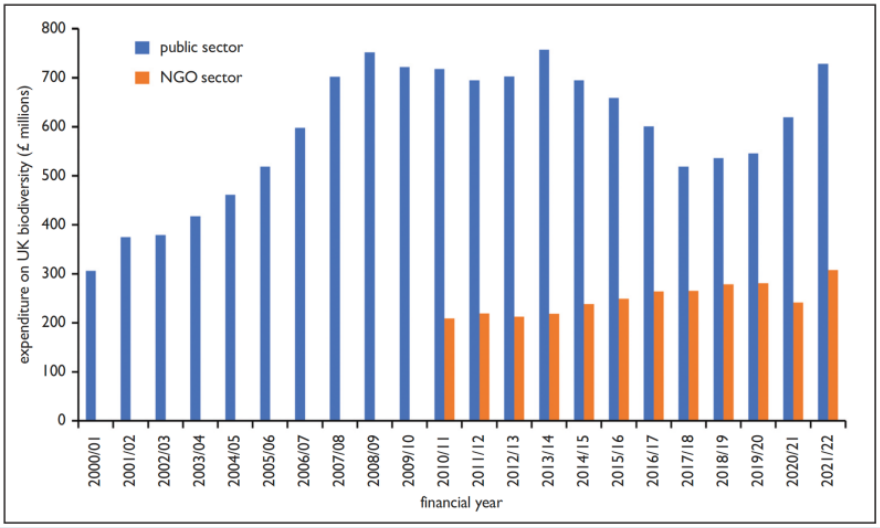

Fig. 3. Public sector and NGO expenditure on UK biodiversity, 2000/01 to 2021/22 (UK Biodiversity Indicator E2). Adjusted to 2021/22 prices; NGO expenditure reported from 2010/11 onwards only.

Species recovery projects funded through AfBiE are built on foundations provided by existing 'business as usual' conservation effort, such as nature reserves and other protected area networks, and policy development and advocacy to ensure that government policy, legislation and delivery mechanisms are fit for purpose. Land managers and landowners, businesses, other sectors of government and private individuals also play a role. The engagement of thousands of individuals in voluntary activities is vital to conservation delivery and much of this voluntary effort supports species-focused work (see, e.g., box 8). It is estimated that volunteer time spent on conservation activities increased by 61% between 2000 and 2019, with a total of 9.5 million volunteer-hours contributed to 14 conservation NGOs in 2019, although effort in 2020 and 2021 was lower, this can be attributed to the impact of the Covid-19 pandemic (JNCC 2023).

Notwithstanding such a wide base of support for conservation action, the resources available are – and have long been – insufficient for the scale of the task required to halt and reverse long-term biodiversity loss. It is therefore vital that deployment of these resources is carefully considered and prioritised. AfBiE uses a 'triage' approach, founded upon conservation concern and extinction risk (Stanbury *et al*. 2021), to initially identify the species in most need of help. However, a range of other practical factors are also considered, including the likelihood of conservation action being successful, the risks of not acting, opportunities to work with other partners who may bring expertise and resources allowing others who are better placed to lead on the conservation of particular species, the cost of action, and synergies with existing conservation action.

Species targeted by AfBiE

Up to 2021/22, nearly 50 bird species have been targeted by AfBiE, although the level of expenditure and project scope varies. A total of 30 species have received substantial investment through AfBiE for either research or recovery action, or both (table 1). Expanded accounts are given in boxes 4–11 for eight species, which have been chosen to reflect the range of challenges faced, actions taken, and variation in the success achieved, since not all projects have been successful. Most have achieved their goals within the scope of what could be reasonably achieved by AfBiE, recognising that some factors and policy mechanisms are beyond its direct control and that the recovery of some species ultimately relies upon changing the way in which entire land- or seascapes are managed.

Table 1. Action for species targeted under AfBiE.

species	*primary* focus research	recovery	description of work conducted under AfBiE
European Turtle Dove *Streptopelia turtur**	Y	Y	See box 9.
Corn Crake *Crex crex**		Y	Translocation project: Corn Crakes were released on the Nene Washes, Cambridgeshire between 2003 and 2016. Birds returned to breed, with the local population peaking at 24 singing males, but a permanent population has failed to establish.
Eurasian Bittern *Botaurus stellaris*	Y	Y	See box 4.
Stone-curlew *Burhinus oedicnemus*	Y	Y	See box 8.
Northern Lapwing *Vanellus vanellus*	Y	Y	Extensive research, informing management of protected lowland wet grassland sites and agri-environment measures deployed in the wider countryside, including fallow plots and trialling habitat management of upland grassland.
Eurasian Curlew *Numenius arquata*	Y		Diagnosis and trial management testing habitat management and predator control in the uplands.
Black-tailed Godwit *Limosa limosa*	Y	Y	Site management and research focused at the core East Anglian sites, then head-starting of captive-reared birds under Project Godwit from 2017.
Common Snipe *Gallinago gallinago*	Y		Research into habitat management on lowland wet grassland.
Common Redshank *Tringa totanus*	Y	Y	Research into habitat management on lowland wet grassland and saltmarsh.
Herring Gull *Larus argentatus*	Y		Research into breeding ecology and drivers of population declines at key coastal sites (also on Lesser Black-backed Gull *Larus fuscus*).
Little Tern *Sternula albifrons*	Y	Y	Protection of key sites in Dorset and Norfolk, and research into mitigating predation impacts.
Roseate Tern *Sterna dougallii*		Y	Research into demography (alongside RSPB management of key sites).
Marsh Harrier *Circus aeruginosus**		Y	Species protection and monitoring in Lincolnshire and Norfolk in the Wash Harrier Project – see also Montagu's Harrier.
Montagu's Harrier *Circus pygargus*		Y	Species protection and monitoring in Lincolnshire and Norfolk in the Wash Harrier Project – see also Marsh Harrier.
Red Kite *Milvus milvus**		Y	See box 6.
Lesser Spotted Woodpecker *Dryobates minor*	Y		Research in species ecology and solution trialling.
Red-billed Chough *Pyrrhocorax pyrrhocorax**		Y	Following the natural return of Chough to Cornwall in 2001, a programme of nest protection and habitat management.
Willow Tit *Poecile montanus**	Y	Y	See box 10.
Eurasian Skylark *Alauda arvensis*	Y	Y	See box 7.
Wood Warbler *Phylloscopus sibilatrix*	Y		See box 11.
Common Starling *Sturnus vulgaris*	Y		Research into potential drivers of decline.
Ring Ouzel *Turdus torquatus**	Y		Trial management at two RSPB reserves (Dove Stone and Geltsdale), manipulating habitat through changed grazing regimes.
Spotted Flycatcher *Muscicapa striata*	Y		Research into potential drivers of decline.
Tree Sparrow *Passer montanus*		Y	Research into solution trialling and local recovery projects in northern England.
Yellow Wagtail *Motacilla flava*	Y		Research into breeding ecology and trialling management solutions in arable farmland.
Hawfinch *Coccothraustes coccothraustes*	Y		Research into species ecology and drivers of decline.
Twite *Linaria flavirostris**		Y	Long-running SRP in South Pennines, working with farming community to improve food resources around nesting colonies. Also includes solution trialling and surveys.
Corn Bunting *Emberiza calandra*	Y	Y	Research and recovery project on the isolated Cornish population until 2010, and a series of research projects into drivers of decline and trialling agri-environment solutions in eastern England.
Yellowhammer *Emberiza citrinella*	Y		Research into grassland management.
Cirl Bunting *Emberiza cirlus**	Y	Y	See box 5.

* Have received single-species surveys under the SCARABBS programme.

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Box 2: Action for farmland birds

While 11 birds primarily of farmland (as defined by Gibbons *et al.* 1993) have been the subjects of species-specific research and/or recovery projects under AfBiE (see table 1 and boxes 5, 7, 8 and 9), there has also been a range of projects delivering benefits for farmland birds more generally. In the early years of the agreement, support was provided to regional farmland bird recovery projects in southwest and northeast England, Wessex and the East Midlands. Subsequently, AfBiE has supported a range of research projects, including those looking at the use of bioenergy crops, (Bright *et al.* 2013) assessing the benefits of agri-environment options intended for farmland birds for a wider array of biodiversity, such as invertebrates and arable wildflowers (e.g. MacDonald *et al.* 2012a), the benefits of organic farming for biodiversity (Hole *et al.* 2005), the effects of predators on ground-nesting birds, and the impact of field drainage on ground invertebrates. In addition, there have been projects intended to inform the delivery of agri-environment schemes for farmland birds and to assess their impact. The *Bird Conservation Targeting Project* collated distribution data from a wide variety of sources to generate maps which identified the most important areas for priority farmland birds, enabling Higher Level Stewardship (HLS) to be targeted where it could provide the greatest benefit. AfBiE-funded research on farmland birds showed that many priority species fared better on HLS farms, but that the area of land under higher tier schemes was insufficient to support wider population-level recovery (Bright *et al.* 2015; Walker *et al.* 2018).

46. Corn Bunting *Emberiza calandra*, Norfolk, April 2009.

More recent work has estimated that 47% of arable farmland and 26% of pastoral farmland would need to be managed under higher tier agreements to increase farmland bird populations by 10% over ten years, although these percentages would fall to 34% and 17% respectively if action was targeted towards areas with high densities of priority species, and to 21% on arable land if Turtle Dove conservation was delivered outwith generic agri-environment provision (Sharps *et al.* 2023). These percentages are far higher than have been achieved by agri-environment schemes in England to date.

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For other species (table 2), the work conducted has been of a restricted scope or short duration, such as a literature review (e.g. on the status of Red-backed Shrike *Lanius collurio*), more limited research (e.g. supporting PhD studies on Common Cuckoo *Cuculus canorus*), or single-year national

surveys conducted under the Statutory Conservation Agency and RSPB Annual Breeding Bird Scheme (SCARABBS) (e.g. for Spotted Crake *Porzana porzana*). Some of these species, such as the Common Crane *Grus grus*, have been the focus of conservation projects outside of AfBiE.

Table 2. Species targeted by AfBiE but work of restricted scope and/or short duration.

Black Grouse *Lyrurus tetrix**	Red-backed Shrike *Lanius collurio*
European Nightjar *Caprimulgus europaeus**	Marsh Tit *Poecile palustris*
Common Cuckoo *Cuculus canorus*	Woodlark *Lullula arborea**
Spotted Crake *Porzana porzana**	Aquatic Warbler *Acrocephalus paludicola*
Common Crane *Grus grus*	Grasshopper Warbler *Locustella naevia*
Balearic Shearwater *Puffinus mauretanicus*	Dartford Warbler *Curruca undata**
Kittiwake *Rissa tridactyla*	House Sparrow *Passer domesticus*
Common Kestrel *Falco tinnunculus*	Tree Pipit *Anthus trivialis*
Merlin *Falco columbarius**	Lesser Redpoll *Acanthis cabaret*

* Have received single-species surveys under the SCARABBS programme.

There are also a number of species that have benefited from AfBiE projects aimed at a suite of species, most often based on habitat use. Many of these projects have targeted not only farmland birds (see box 2), but also waders, seabirds and other coastal breeding species (see box 3). A conservative estimate is that 70 bird species have received conservation action in some form delivered through AfBiE, and it is also worth recognising the benefits for a wider range of birds and other taxa, such as those benefiting from reedbed creation for Eurasian Bitterns (Sears *et al.* 2013), or from agri-environment options for Stone-curlews (MacDonald *et al.* 2012a) and Cirl Buntings (MacDonald *et al.* 2012b).

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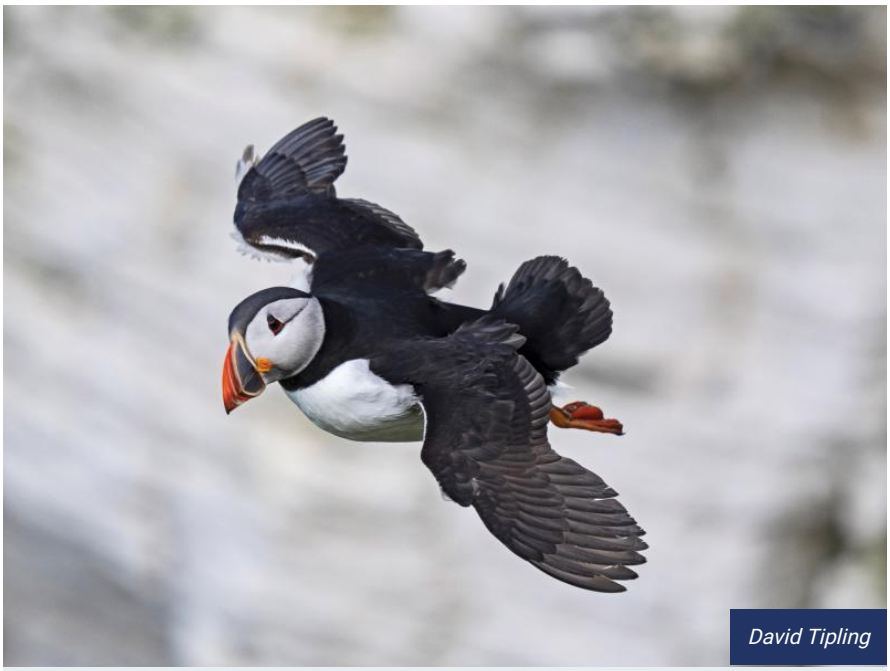
Box 3. Supporting seabirds

England supports over 500,000 breeding pairs of seabirds of 22 regularly occurring species. As elsewhere in the UK, these seabirds are distributed

between offshore islands, mainland cliffs and some important inland sites. In addition, areas of sand and shingle, often on islands and located in coastal lagoons, are particularly valuable for gulls and terns. AfBiE has supported the development of a strategic approach to the conservation of seabirds in England, contributing key data to underpin this programme and identifying priority sites and actions. The most recent assessment of the state of seabird colonies in England was completed in 2021 (Lock *et al*. 2022); this highlighted priority sites and actions required to recover English seabird populations and informed the development of the England Seabird Conservation and Recovery Pathway (to be published in 2024).

A key area has been the development of strategies and programmes of island restoration, including developing an island database and a model for prioritising island projects (Stanbury *et al.* 2017) and reporting on progress (Thomas *et al*. 2017). AfBiE-funded baseline-surveys on Lundy, Devon, and on the Isles of Scilly have demonstrated the parlous state of seabird populations on those islands and the threats they face. This made the case for immediate action to restore populations, principally by the removal of non-native predators, followed by stringent biosecurity. Subsequent AfBiE-supported monitoring has demonstrated the outcome of the eradication of Brown Rats *Rattus norvegicus* and Black Rats *R. rattus* on Lundy, and the success of Brown Rat eradication on St Agnes and Gugh, both Isles of Scilly, and makes the case for wider restoration across the Scilly archipelago (Heaney *et al*. 2008; Brown *et al.* 2011). Seabird recovery on Lundy has been spectacular: counts from 2023 show an increase in Manx Shearwaters *Puffinus puffinus* from 500 Apparently Occupied Burrows to 25,276, and the recolonisation of European Storm-petrels *Hydrobates pelagicus* since rat eradication in 2001. AfBiE continues to support the restoration of seabirds on the Isles of Scilly

through developing innovative approaches to eradication and biosecurity in partnership with the Isles of Scilly Wildlife Trust, and to support the recovery on Lundy working with the National Trust and Landmark Trust.



47. Atlantic Puffin *Fratercula arctica*, Yorkshire, April 2022.

The other key area of focus has been on breeding gulls and terns. AfBiE work documented the loss or decline of most Kittiwake *Rissa tridactyla* colonies in southern Britain and conducted research to document and attempt to understand the loss of some of the largest gull colonies on 'natural' habitats in Europe, such as those at Orfordness, Suffolk, and Walney, Cumbria. As yet, this work hasn't identified a means of restoring these colonies, some of which numbered in the tens of thousands of pairs. During the period under review, the RSPB has led EU-LIFE projects on Little Tern Sternula albifrons (2013–19) and Roseate Tern Sterna dougallii (2015–20). These programmes

have driven the conservation management for these species and funded essential site management, site staff and monitoring. AfBiE has complemented this work through delivering a review of Little Tern data (Wilson *et al*. 2020) and population modelling for Roseate Tern (Seward 2018), which have helped to set the conservation strategies post EU-LIFE funding. Most recently, Little Tern conservation has been brought back into the AfBiE programme as part of a wider beach-nesting bird programme for England, which also includes important sites for Ringed Plover *Charadrius hiaticula* and Eurasian Oystercatcher *Haematopus ostralegus* (Liley *et al*. 2021).

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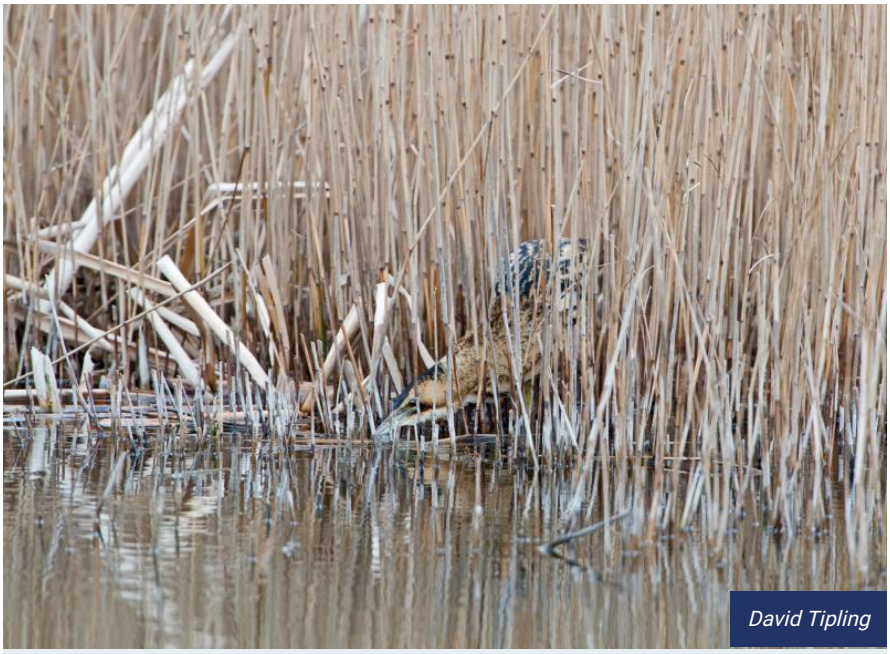
Box 4. Eurasian Bitterns booming once again

A classic conservation success story, the recovery of the Eurasian Bittern in England appears straightforward – create habitat and watch the species increase – but this simplification overlooks a complex story of excellent research enabling well-informed, targeted and precise habitat-based conservation interventions.

Wetland drainage on a massive scale drove the national extinction of this once-widespread species in the late nineteenth century but, rather against the odds, birds returned to nest in the Norfolk Broads in 1911, with numbers increasing to a peak of around 80 booming males in the 1950s before declining once again. A programme of research started in 1990, although the decline continued; by 1997 there were only 11 booming males at seven sites in England and a second extinction looked distinctly possible. An analysis of site conditions identified reedbed succession and drying-out as the principal

drivers of decline (Tyler *et al.* 1998), and radio-tracking studies then provided more detailed insight to inform site management. Gradually, through painstaking effort on this elusive species by RSPB scientists, a full picture of what Eurasian Bitterns needed was created (reviewed by Brown *et al*. 2012); crucially, this included knowledge of how to manipulate habitat to increase the availability and accessibility of key fish prey species such as Rudd *Scardinius erythrophthalmus*.



48. Eurasian Bittern *Botaurus stellaris*, Norfolk, February 2014.

This knowledge fed into the *Bittern Recovery Project,* initiated by NE in 1994, with habitat management improving conditions across a suite of existing reedbeds. This alone was considered insufficient to meet a published Biodiversity Action Plan target of 100 booming males by 2020, so an ambitious programme of wetland creation and restoration was initiated by NE and the RSPB, supported by EU Life-Nature grants covering 1996–2000 and

2002–06. The first enabled the restoration of 350 ha of reedbed at 13 sites, most crucially at RSPB Minsmere, Suffolk, while the second enabled the creation of 300 ha of new reedbed alongside further restoration. Crucially, this latter stage focused on sites away from the coastal sites in the East Anglian core range to encourage expansion to new sites, such as the RSPB reserves at Lakenheath, Suffolk, and Ham Wall, in the wider matrix of the Avalon Marshes, Somerset. By 2006, there were about 2,500 ha of suitable reedbed in England – and a population response to match. The numbers of booming male Eurasian Bitterns recorded by the AfBiE annual monitoring programme have increased nearly every year since 2006, and in 2021 a total of 289 boomers were recorded, far more in Britain that at any time since monitoring began.

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An overview of conservation action under AfBiE

The species included within AfBiE represent a spectrum of England's avifauna. Species found breeding in all major habitats have been targeted, with farmland birds most strongly represented. Likewise, species that differ in abundance and distribution, from extremely rare and localised species, such as Black-tailed Godwit *Limosa limosa* and Roseate Tern, to abundant but declining breeders, including Common Starling *Sturnus vulgaris* and Skylark *Alauda arvensis,* have been targeted. Taxonomically, the spread has also been broad, although the action for six species of wader reflects the high level of conservation concern for that group.

Of the 30 species to have been the recipients of substantial investment under

AfBiE, 24 have been the subject of research projects. Of these, 17 have progressed into trial management stages, and 12 into recovery management. A further six species have received recovery management without substantial research attention under AfBiE, for a variety of reasons, such as where the conservation action needed was obvious or known from previous work (e.g. knowledge of the habitat requirements of Corn Crakes *Crex crex* necessary for the AfBiE-funded translocation project in the Cambridgeshire Fens was informed by prior RSPB research in Scotland), although in some cases subsequent research has informed conservation delivery.

The action taken to recover species is multifaceted and bespoke to their requirements and the causes of decline; it is rare that only a single type of intervention (from the 'toolkit' outlined above) is required. However, it is possible to broadly define the principal action(s) taken for each of the 30 species to have received significant investment in trial management and/or recovery management under AfBiE. Three species – Corn Crake, Red Kite and Cirl Bunting – have been translocated into regions from where they have previously occurred but had subsequently disappeared. The protection of birds and their nesting sites from disturbance and destruction, whether unintentional or intentional, has been crucial for conservation of six species, for example Red-billed Chough *Pyrrhocorax pyrrhocorax* and Little Tern *Sternula albifrons*. The large-scale creation of new habitat has been important for the recovery of only one species, the Eurasian Bittern; the management of existing habitat is a more significant delivery mechanism for most species. Twelve species, such as Stone-curlew, Cirl Bunting and Twite *Linaria flavirostris*, have been targeted by conservation action that has modified the management of existing habitats, including that to adapt farming methods.

An important distinction to make, particularly with regard to the management of habitat, is between action that can be delivered within the scope of AfBiE and that which requires wide-scale deployment that exceeds the capacity of the partnership to deliver. It is generally easier to recover Conservation Dependent species, which typically have smaller, range-restricted populations and are associated with semi-natural habitats, than Policy Dependent species, which tend to be much more common and widely dispersed and are associated with more extensive general habitats such as farmland, forestry or marine. This is because the rate of recovery will depend on both the efficacy of the recovery solution and the proportion of the affected population that solution is made available to. For Policy Dependent species, AfBiE has enabled the research to identify the action required and may have also supported additional work to help deliver that action (e.g. by improving the spatial targeting of agri-environment management), but the interventions themselves need to be supported by policy decisions and budgets well beyond the scope of AfBiE – not least by the Government's agri-environment and forestry schemes.

While projects have been spread across species, a larger proportion of more-abundant and widespread birds have received research attention but not recovery action. This, in part, reflects a shift in focus towards the conservation of priority species with larger populations for which work has not yet advanced to trial or recovery management; there is a trend towards projects on more abundant species in later years of the AfBiE partnership.

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Box 5. Cirl Bunting

Once recorded as far north as Cumbria, the Cirl Bunting was still found thinly scattered across southern English counties as recently as the 1960s; then the range contracted further and numbers crashed to a low of 118 pairs in 1989, almost all in southern Devon. Declines were linked to agricultural intensification, and RSPB research from 1988 identified the three-fold causes of decline: low food availability in winter due to the loss of weedy winter stubbles (Evans & Smith 1994); the lack of food, particularly grasshoppers (Orthoptera), in the breeding season due to intensive grassland management, leading to low productivity (Evans *et al.* 1997); and the loss of suitable hedgerows for breeding (Evans 1997).

This knowledge enabled rapid action to prevent the extinction of Cirl Buntings, with an SRP launched in 1993. A 'special project' option specifically for Cirl Buntings was developed within the original Countryside Stewardship Scheme (CSS) to incentivise farmers to grow low-input spring barley crops, which resulted in food-rich stubbles remaining after harvest to support buntings over the winter and into early spring. RSPB project officers were able to recruit local farmers into the scheme and ensure that such crops were located appropriately. Cirl Bunting populations on farms in the CSS increased by 83% between 1992 and 1998 (Peach *et al.* 2001). Thanks to scientifically informed conservation action, delivered with support from a wide range of partners and the crucial engagement of farmers and landowners, the population recovered to 453 pairs by 1998 and to 1,078 by 2016 (fig. 4). Furthermore, the pioneering approach adopted by the project has had an influence well beyond the recovery of Cirl Buntings, by providing a model for how to conserve other species dependent on the farmed environment.

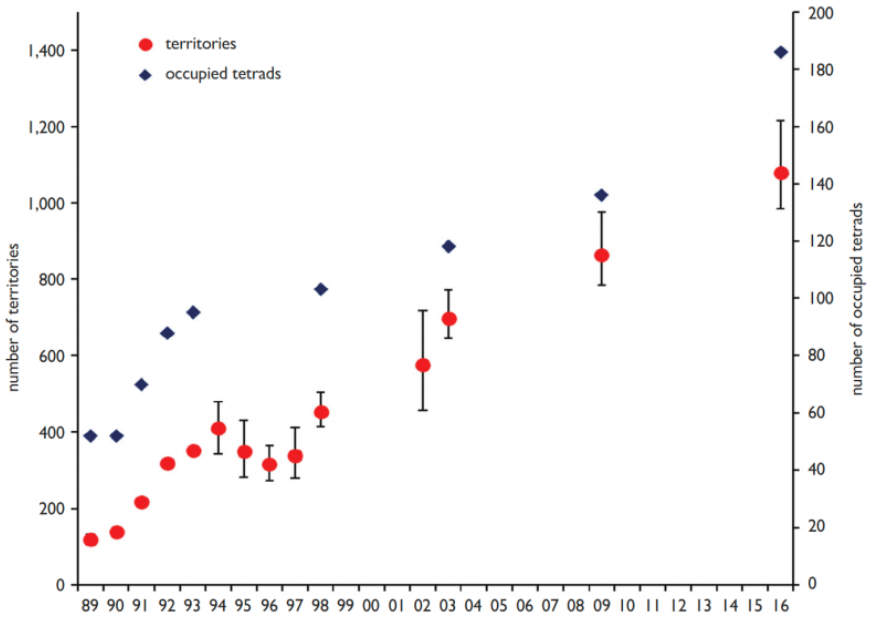

Fig. 4. Cirl Bunting *Emberiza cirlus* trends in England, 1989–2016.

While action in Devon produced an impressive population recovery, the sedentary habits of Cirl Buntings meant that the population remained restricted to south Devon. Therefore, a translocation project, taking and rearing chicks from the Devon population for release, was initiated on the Roseland Peninsula, Cornwall, the first releases occurring in 2006. By 2011, 362 individuals had been released, alongside a programme of work with local farmers to ensure sympathetic habitat management (Jeffs *et al.* 2016). By 2016, the Cornish population had reached 65 pairs, providing a second nucleus and basis for further expansion.

While an inspiring conservation success and a model for how threatened species can be saved within the modern farmed landscape, Cirl Buntings remain dependent on specific farming methods for their continued survival. The species is Policy Dependent (see box 1), requiring government policies to

encourage and deliver sympathetic habitat management with adequate funding to support farmers engaged in this management.

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Assessing conservation action delivered under AfBiE

We wished to assess the progress delivered under the AfBiE programme and the factors that might have influenced progress for individual species. Our intention was to use quantitative measures of biological/demographic changes (e.g. population trends) in response to interventions, and to relate variation in those responses to correlates such as species characteristics and the conservation work conducted. Ultimately, our power to measure the success was limited by the small number of projects and inconsistencies in how both conservation interventions and species' responses were monitored and, hence, quantified. We did, however, find a weak relationship between success and both the type of conservation action and the size of the population being targeted. Projects on species for which the primary method of conservation action was translocation or protection were more likely to be partially or wholly successful than those that relied on habitat management, and the mean rate of species population growth was higher too. Likewise, we found an indication that species with smaller populations at the start of recovery projects showed a larger positive response to conservation action.

A large proportion of the work funded under AfBiE in the last decade has involved research on the causes of decline and possible conservation remedies, but in many instances research has not yet progressed to testing solutions. For these, it would be unfair to assess success in terms of national

species population recovery, but we can assess whether the research has been successful in determining causes of declines and identifying remedial actions.

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Box 6. Red Kite: England's most successful raptor?

The Red Kite disappeared as a breeding species in England in the 1870s and, as a result of persecution, was nearly lost from the UK entirely in the 1930s before the remnant Welsh population began an extremely slow recovery. By 1989, the Welsh population had reached 52 pairs but remained vulnerable, and recovery through natural recolonisation into a range that once covered most of the UK seemed a distant prospect. The NCC and RSPB formed a UK Red Kite Project Team to plan a coordinated translocation programme, working with many additional partners, and the first releases were made in Scotland (on the Black Isle, Highland) and England in 1989: 13 birds flew free in the Chilterns, Oxfordshire/Buckinghamshire/Hertfordshire/Bedfordshire, on 1st August 1989, while a total of 93 birds were released there up to 1994. There were further release projects in the East Midlands (1995–98), Yorkshire (1999–2003), Gateshead, Co. Durham (2004–06), and Cumbria (2010–12), as well as in two other areas in Scotland and one in Northern Ireland. In total, 415 birds were released in England. Initially, birds were sourced mostly from Spain but a rapidly increasing population in southern England soon became the source for subsequent translocations. With the first successful breeding of the reintroduced poplation taking place in 1992, the Red Kite was back in England after an absence of around 120 years; fig. 5 shows the subsequent

increase, monitored by the Rare Breeding Birds Panel (RBBP) until 2012 (when it ceased to be regarded as rare enough for RBBP to minotor) and by the BBS thereafter. While the population has increased rapidly, success has not been universal. Smart *et al*. (2010) showed how illegal killing had drastically restricted the rate of population growth in northern Scotland, and it is likely that the same issue has slowed establishment from the Gateshead reintroduction programme.

49. Red Kite *Milvus milvus*, Norfolk, February 2020.

The resurgence of Red Kites has caused some local conservation issues by increasing predation pressure; research under AfBiE demonstrated that supplementary feeding of kites reduced predation on Northern Lapwing *Vanellus vanellus* chicks (Mason *et al.* 2021). Regardless, the recovery of this species – which has increased more rapidly than any other

species over recent decades – has to be regarded as a conservation triumph. Remarkably, in 2022, 30 Red Kite chicks were collected under licence from nests in England and flown to Spain to help bolster the now-struggling Spanish population.

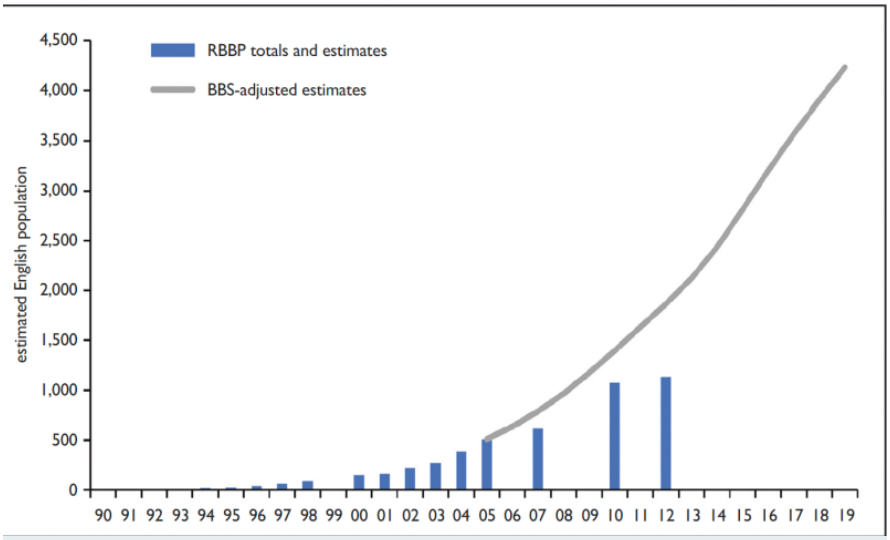

Fig. 5. Red Kite *Milvus milvus* trend in England, 1990–2019.

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Box 7. Skylarks: the lark not (yet) ascending

The conservation successes highlighted here target threatened species such as Eurasian Bittern (box 4) and Cirl Bunting (box 5) that have small populations and restricted ranges (although were once much more widely distributed). These SRPs tackled complex and challenging issues in order to deliver solutions at the required scale, but this was greatly aided by the fact that delivery was largely under the influence of the conservation organisations involved – managing land under conservation ownership (as

was the case for Eurasian Bittern) or working with landowners and managers in relatively restricted areas of high importance for the target species (as was the case with Cirl Bunting). What has proven more intractable is conservation at a wider scale, which necessitates delivery of on-the-ground action by other sectors, most notably by farmers.

50. Eurasian Skylark *Alauda arvensis*, Norfolk, May 2009.

The rapid decline in Skylarks in the UK began in the late 1970s and accelerated through the early 1980s. Between 1978 and 1993, the population fell by 46%, representing around half a million lost pairs, though the species remained widespread with breeding evidence being recorded from all but five of England's 10-km squares in the last breeding bird atlas (Balmer *et al.* 2013). Initial research identified a fall in productivity as the cause of this decline, with a link to the management of cropland breeding habitat. The switch from spring to autumn sowing of cereal crops (especially 'winter

wheat') resulted in a crop that was taller and denser earlier in the breeding season and thus unsuitable for nesting and feeding Skylarks. This means that birds have fewer breeding attempts, often only one, compared to up to three in other habitats, such as traditional spring-sown cereals (Donald 2004). Furthermore, owing to the more vigorous crop growth, birds remaining to breed in winter wheat are more likely to nest on or near the tramlines created by agricultural machinery, making them vulnerable to destruction by tractor wheels as well as increased rates of predation (Donald *et al.* 2002).

While Skylarks also faced problems in other habitats, the ubiquity of winter wheat made this the biggest problem for the species, so NE and RSPB collaborated with a wide range of partners on the *Sustainable Arable Farming For an Improved Environment* project, to test a solution to provide a short and sparse sward within modern arable environments. These 'Skylark plots' are patches within cereal fields, approximately 4x4 m in size, which are left uncropped (either by not sowing or by subsequently spraying the crop off), thus leaving sparsely vegetated ground attractive for feeding and nesting. Dispersed around a wheat field at two plots per ha, and thus sacrificing just 0.32% of crop area, they are capable of increasing overall productivity by around 50% (Morris *et al.* 2004). Their deployment at the RSPB's own Hope Farm in Cambridgeshire enabled the Skylark population to rise from 10 to 43 pairs in 11 years. Crucially, Skylark plots, as funded by successive agri-environment schemes, were agronomically positive for farmers, offering a recompense through subsidy that was at least double the cost of lost crop yield.

Unfortunately, that is where this story has stalled. Take-up of Skylark plots as an option has been low amongst farmers, at least in part because of an apparent dislike of agri-environment options that interfere with production in

field centres, regardless of the economic benefits on offer. A feasible solution for England's depleted Skylark population has been found but, as yet, the scheme design has not facilitated its delivery at a sufficient scale to elicit a national population response.

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Measuring conservation success

Of 24 projects that involved research, we found that seven (29%) had not yet been successful in identifying the conservation action required for species recovery (e.g. for Lesser Spotted Woodpecker *Dryobates minor*), nine (38%) had been partially so (e.g. for Corn Bunting), and eight (33%), completely so (e.g. for Eurasian Bittern). Thus, 71% of research projects have been either partially or completely successful in identifying actions required for recovery.

Six of these 24 projects are still ongoing and the fact that research has not been successful in determining the action required to deliver population recovery does not mean it will not ultimately do so. To date, over 200 papers have been published from AfBiE research (though not all may have arisen from work funded directly); see the supplementary online material for the full list.

Table 3 assesses progress for the 30 species to have received significant investment through AfBiE; it should be acknowledged that, in some cases, action delivered outwith AfBiE – e.g., for Roseate Tern and Little Tern – may have played a significant role in the progress achieved. Of the 18 species that have progressed along the recovery curve to receive recovery management, six (33%) have not shown a recovery, five (28%) have shown recoveries at

local scales, and seven (39%) have shown substantial population recoveries at the national (England) scale. Thus, 67% of recovery projects were either partially or completely successful. Of the six species for which recovery management has not resulted in population recovery, three – Corn Crake, Montagu's Harrier and Twite *Linaria flavirostris* – had recovery management funded within AfBiE. The scale of conservation required for the other three species – Skylark, Corn Bunting and Yellowhammer *E. citrinella* – meant that the mechanism for delivering recovery lay outside AfBiE, for example, in large-scale government-funded agri-environment schemes.

Table 3. Qualitative assessments of progress for species targeted with significant resources through AfBiE.

Recovery management has led to national population recovery	Montagu's Harrier *Circus pygargus*
Eurasian Bittern *Botaurus stellaris*	Eurasian Skylark *Alauda arvensis*
Eurasian Stone-curlew *Burhinus oedicnemus*	Twite *Linaria flavirostris*
Roseate Tern *Sterna dougallii*	Yellowhammer *Emberiza citrinella*
Marsh Harrier *Circus aeruginosus*	**Diagnosis completed, but trial management and/or recovery management still in progress**
Red Kite *Milvus milvus*	European Turtle Dove *Streptopelia turtur*
Red-billed Chough *Pyrrhocorax pyrrhocorax*	Eurasian Curlew *Numenius arquata*
Cirl Bunting *Emberiza cirlus*	Black-tailed Godwit *Limosa limosa*
Recovery management has led to local population recoveries	Ring Ouzel *Turdus torquatus*
Northern Lapwing *Vanellus vanellus*	Willow Tit *Poecile montanus*
Common Snipe *Gallinago gallinago*	**Diagnosis work has not identified trial management and/or recovery management actions**
Common Redshank *Tringa totanus*	European Herring Gull *Larus argentatus*
Little Tern *Sternula albifrons*	Lesser Spotted Woodpecker *Dryobates minor*
Tree Sparrow *Passer montanus*	Wood Warbler *Phylloscopus sibilatrix*
Corn Bunting *Emberiza calandra*	Common Starling *Sturnus vulgaris*
Recovery management has not resulted in population recovery	Spotted Flycatcher *Muscicapa striata*
Corn Crake *Crex crex*	Yellow Wagtail *Motacilla flava*
	Hawfinch *Coccothraustes coccothraustes*

Given that most species targeted by AfBiE have received attention at (or near) the whole-population level, there are few 'control' populations (with adequate monitoring) that would enable us to compare populations with and without conservation action. It is, however, legitimate to consider what might have happened to populations in the absence of AfBiE (the 'counterfactual', as it is termed, reflecting the 'conservation legacy' or the difference between the counterfactual status and the current status; Grace *et al.* 2021). While the

slow recovery of the Welsh population of Red Kites (box 6) may have resulted in expansion into England by the present day, the population is clearly much larger owing to the translocations in five English regions and in Scotland; English populations of species – including Stone-curlew, Black-tailed Godwit and Little Tern – are almost certainly considerably healthier than they would have been without AfBiE; and it is probable that the Eurasian Bittern and Cirl Bunting would have gone extinct in England (and hence the UK) in the 1990s without the collaborative actions to restore their populations (boxes 4–5).

For other species, it is harder to assess impact in the absence of counterfactuals. However, the suite of actions for farmland birds identified by AfBiE projects (see box 2) have provided much of the basis for the design and operational delivery of agri-environment schemes in England over the last two decades, and studies of the impact of these schemes have shown that they have benefited target species, even though the scale of deployment has not been sufficient for national population recovery (Baker *et al.* 2012; Walker *et al.* 2018; Sharps *et al.* 2023). Furthermore, this work has been used by the Department for Environment, Food & Rural Affairs (Defra) to model and shape recovery targets. Similarly, Jellesmark *et al.* (2023) demonstrated how nature reserve management led to increased numbers of target breeding waders, with wader populations being higher on sites with longer periods of management and with specific management (such as predator-proof fencing), thus benefiting breeding wader populations at these sites but without reversing wider, often declining trends.

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Box 8.

Stone-curlew

The the Stone-curlew was once found widely on dry grasslands, heathlands and free-draining arable land as far north as Yorkshire. By the 1930s, the range had retracted considerably, and the population had fallen to an estimated 1,000–2,000 pairs, due largely to the loss of unimproved grassland and heathland habitats. The decline continued with the deterioration of remaining grasslands and there may have been as few as 130 pairs left by the mid 1980s. The surviving population was found largely on arable land in Wessex (centred around Salisbury Plain) and in the Brecks of Norfolk and Suffolk. As with Skylarks (box 7), the shift to autumn-sown cereals resulted in fewer fields with the sparse short sward and patches of bare stony ground that Stone-curlews require.

51. Eurasian Stone-curlew *Burhinus oedicnemus*, Norfolk, April 2009.

An NCC (later NE) and RSPB recovery project began in 1987, with a focus on

safeguarding the species in arable crops by finding nests then working with farmers to ensure that eggs and chicks were not lost during agricultural operations. As a result of this work, the breeding population grew to over 250 pairs by the year 2000 and peaked at 473 pairs in 2012 before subsequently settling at over 350 pairs in recent years (Woodward *et al.* 2020), and the species moved from the Red to the Amber list. In recent years, this work has been a wonderful example of the importance of volunteers in conservation action, as much of the highly skilled and intensive effort required is provided by dedicated volunteers. However, to ensure a sustainable future and to reduce the reliance on ongoing conservation efforts in arable land, there has been concerted effort to increase the proportion of the population breeding away from crops, with research directed at understanding how best to manage the remaining fragments of natural and semi-natural habitat so that they might attract and retain a greater proportion of the overall population (e.g. by increasing the area of bare and sparsely vegetated ground; Hawkes *et al.* (2021)). In areas with breeding Stone-curlews, farmers can receive agri-environment payments for providing 2-ha fallow plots, in which breeding success is higher than within the surrounding crop. An EU-LIFE funded project between 2012 and 2016 allowed many more farmers to be engaged in this effective conservation method.

The population remains vulnerable, with a substantial drop in 2013 owing to high mortality in adult birds during cold weather in March and April, and a substantial proportion of the population remaining vulnerable to agricultural operations.

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Discussion

Measuring progress

Three decades of partnership working between NE and RSPB has focused on conservation action for the most threatened of England's birds. We have shown that 71% and 67% of research and recovery projects, respectively, were either partially or completely successful in their goals. We are unaware of comparable studies but consider this level of progress to be highly encouraging. We have shared our results here, recognising both successes and failures. Partnership work has underpinned some of the most celebrated conservation success stories of recent times, bringing the Eurasian Bittern, Stone-curlew, Roseate Tern and Cirl Bunting back from the brink of extinction in England, and returning the Red Kite from national extinction. Three species have seen their status improve from Red-listed to Amber-listed (Eurasian Bittern, Stone-curlew and Marsh Harrier *Circus aeruginosus*) and, in the case of Red Kite, to Green-listed.

For other species, such as Northern Lapwing *Vanellus vanellus*, Little Tern and Red-billed Chough, the impact of AfBiE is harder to assess, but there is evidence to suggest that their status is better than it would have been otherwise. The same could be argued for the range of farmland birds that have received research attention from other NGOs, such as the BTO and Game & Wildlife Conservation Trust. This body of research has informed the design and delivery of agri-environment schemes that have been shown to benefit populations of priority farmland birds at a farm and landscape scale (see, e.g., Walker *et al.* 2018, Sharps *et al.* 2023). However, given the lack of recovery at the national population scale, and in some cases the ongoing decline of species, it cannot be argued that such conservation has been successful in a wider sense.

Some projects have not succeeded. The translocation of Corn Crakes at the Nene Washes in Cambridgeshire resulted in the establishment of a small returning population, but that population did not persist beyond the end of the release programme in 2016. In the South Pennines, a multi-partner project engaging the farming community provided seed-rich food resources and other conservation actions for England's last remaining Twite colonies but did not succeeded in arresting decline. Despite the management of 700 ha of hay meadows and pasture for Twites, which included 9,000 plugs of the foodplant Autumn Hawkbit *Scorzoneroides autumnalis* being planted, the breeding population declined by 75% between 2016 and 2021.

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Box 9. European Turtle Dove: saving the UK's fastest-declining bird

The UK's European Turtle Dove population was estimated at 125,000 pairs at the time of the first breeding bird atlas (Sharrock 1976) but the first (AfBiE-funded) national survey in 2021 discovered that numbers had fallen to just 2,100 pairs (Stanbury *et al.* 2023), making it the UK's fastest-declining breeding bird species. With this decline has come a massive contraction of range, which has resulted in the complete disappearance of this much-loved species from many English counties.

Initial research by the Game & Wildlife Conservation Trust (funded by NE and WWF) identified a contraction in the length of the Turtle Dove's breeding season and a consequent drop in productivity (Browne & Aebischer 2003). RSPB research under AfBiE from 2010 onwards focused not just on research on habitat use and understanding demographic parameters (Dunn & Morris

2012), but also on trialling the use of bespoke seed-rich foraging plots and supplementary feeding on arable land as a potential solution to boost the population (Dunn *et al.* 2015). This approach meant working simultaneously on different parts of the species recovery curve (see box 1), as it was felt that there was no time to waste given the precipitous decline in the population. Other elements of a multi-pronged research programme have included assessing the impact of infection by the protozoan parasite *Trichomonas gallinae* (Stockdale *et al.* 2015) and understanding migration routes, hunting pressure and habitat use on the Turtle Dove's passage and wintering grounds.

52. European Turtle Dove *Streptopelia turtur*, Norfolk, June 2022.

Launched in 2012, Operation Turtle Dove (www.operationturtledove.org) – a partnership between the RSPB, NE, Pensthorpe Conservation Trust and Fair

to Nature – engages with farmers and landowners in ‘Turtle Dove Friendly Zones’ in southeast England and East Anglia, with Turtle Dove advisors (funded through AfBiE) providing advice on the creation of feeding and nesting habitat, typically supported by agri-environment scheme payments. In addition, in light of the continent-wide decline in Turtle Doves, the RSPB led on European Commission-funded work to develop an International Single Species Action Plan published in 2018 (Fisher *et al.* 2018). As a result, a moratorium on the autumn hunting of migrating Turtle Doves in France, Spain and Portugal was commenced in 2021; it is estimated that this respite may save 1.1 million Turtle Doves on the west European flyway annually (Lormйe *et al.* 2020). It is hoped that the combination of targeted action on the breeding grounds and reducing mortality on migration may be sufficient to turn around the fortunes of England’s Turtle Doves, in the nick of time.

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Barriers to success

The research we describe here is challenging in many respects and may be hindered by the practical difficulties of working on particular species. Lesser Spotted Woodpeckers, for example, are highly elusive and hard to find outside of a short period early in the breeding season. In most remaining areas of their breeding range, they are found at very low population densities, with individuals roaming over large territories, and their nests are difficult to find, access and monitor – all of which makes research extremely challenging. AfBiE-funded research work between 2005 and 2011 provided useful insights into this species (e.g. Charman *et al.* 2010) but did not make substantial progress in determining the cause(s) of decline and research paused, although has now resumed.

Even for species that are more amenable to study, determining the cause of declines can be extremely challenging (e.g. see box 11). This may be due to complex ecologies, particularly for Afro-Palearctic migrant birds, for which drivers of decline may lie on breeding grounds, wintering grounds or migration routes, and may be complicated by interactions between all three (Vickery *et al*. 2014). On some occasions, the need for urgency may mean that conservation action is trialled based on best available knowledge and practical conservation experience. The rapid decline of the Turtle Dove has resulted in an urgent effort to deliver nesting and feeding habitat in the remaining core breeding areas, alongside policy action at an international scale to tackle the issue of hunting pressure on migration, all the while continuing to undertake research to refine actions and investigate other potential impacts, such as disease and pressures on the wintering grounds (box 8). Finally, species decline may inevitably be driven by multiple factors that are difficult to tease apart.

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Box 10. Bringing the Willow Tit back

Developed by NE and Rethink Nature, a partnership of seven species-focused conservation NGOs including the RSPB, and supported by the Heritage Lottery Fund, the 'Back from the Brink' (BftB; www.naturebftb.co.uk) programme (2017–22) aimed to save 20 wildlife species from extinction and improve the status of over 200 more, with a core partnership of eight organisations working with 89 partners across the country and an estimated 4,000 volunteers. One of the projects entailed the RSPB and Yorkshire Wildlife Trust working together to improve the fortunes of Willow Tits *Poecile*

*montanus*in the Dearne Valley, a remaining stronghold (Carr & Lunn 2017) after the rapid UK decline (94% since 1970) and range contraction in the endemic British subspecies of this woodland bird. AfBiE-funded RSPB research (Lewis *et al.* 2007, 2009) linked the decline to the drying of woodland, although there remains uncertainty about the mechanism and the potential role of other drivers, including management changes and potentially increased competition and predation. Habitat management trials, involving rewetting and the removal of canopy trees, began in 14 woods in the North Midlands in 2014. Repeat surveys will give the first indications of whether this management helps the species.

The BFtB project delivered habitat enhancement at 11 sites in the Dearne Valley, with best current knowledge identifying management of woodland structure, re-wetting, the provision of increased deadwood and artificial nesting sites, and control of non-native species such as Himalayan Balsam *Impatiens glandulifera* and rhododendrons *Rhododendron* spp. as key conservation actions. A landscape management plan for the Dearne Valley Nature Improvement Area, as well as individual site management plans, will ensure that management will be maintained beyond the project life. Key sites have been designated as an aggregate SSSI providing special protection. In addition, a research project used radio-tracking to improve knowledge on habitat use and range size.

A key output of the project was the publication of a guide providing detailed advice on habitat management and surveying and monitoring techniques for Willow Tit (Pinder & Carr 2021), providing a ‘one stop shop’ to those looking to help the species. It may be that action came too late in the Dearne Valley, as despite the above action, the population declined through the period of the project.

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Understanding recovery action

Our limited analyses suggest that AfBiE projects have been more successful when targeting small populations. Of the seven species regarded as having undergone successful recoveries, those with the largest populations at the start of conservation actions were Cirl Bunting (118 pairs) and Stone-curlew (approximately 130 pairs), and two species, Red Kite and Red-billed Chough, were starting from zero in England due to translocation and natural recolonisation, respectively. The greater success when targeting small populations is, we believe, related not just to population size per se but also to the proportion of the population that is influenced by the relevant conservation action. In the successful recovery projects, an extremely high proportion of the population was targeted by action. The restricted geographical extent of the delivery required meant that the available conservation resources were sufficient to elicit a national scale biological response; even so, these were expensive and long-running projects, aided by additional funding through EU grants and agri-environment schemes.

Species translocation projects have provided the most conspicuous progress, such as for Red Kite and Cirl Bunting. These are rightly celebrated, but the scope for further translocations is perhaps limited, and there is a risk that they can detract from the continuing loss of nature and consume a disproportionate share of potential conservation investment. They can also give the impression that reintroduction of a species is the go-to solution, ignoring the environmental degradation and pressures that precipitated the loss of a species.

To date, no AfBiE project (or indeed any other at the England- or UK-wide scale) has been able to deliver recovery for a common and widespread bird species. For example, there are 12 farmland birds common enough to be included within the farmland bird indicator for England that were Red-listed since 2002 or earlier (Gregory *et al.* 2002), in addition to seven scarce and range-restricted species. These widespread birds have been the subjects of extensive research (e.g. as reviewed by Wilson *et al.* 2009) to determine drivers of decline and the factors limiting population size, and to identify and trial remedial action. Trials of these conservation solutions have demonstrated that they work (see, e.g., box 7), and monitoring of the wider delivery has shown that if delivered at sufficient scale, they could halt and reverse the continuing loss of farmland birds (Walker *et al.* 2018; Sharps *et al.* 2023). Yet, farmland bird populations continue to decline.

The annual management cycle in farmland does allow for the prompt testing and delivery of solutions, and bird responses can be relatively rapid (e.g. Bright *et al.* 2015). Habitat modification in other habitats – such as woodland – may take much longer to implement and benefit target species (decades to centuries), although Bellamy *et al.* (2022) demonstrated the impact of management through Woodland Improvement Grants on some target bird species within 7–9 years of implementation. Action may be complicated further still for migrant species for which drivers of decline may be overseas and thus, if these cannot be mitigated by compensating action on English breeding grounds, international conservation action may be required.

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Wood Warbler: still searching for a solution.

Research under the AfBiE programme has typically identified the causes of species' declines then designed and conservation interventions to facilitate recovery; but, in some cases, despite robust and innovative research activities, that progress has not been possible. There has been a substantial research programme on Wood Warblers since the species was Red-listed in 2009 (Eaton *et al.* 2009). Initial research focused on breeding performance at sites in Wales that had been studied in the 1980s; this found no change in habitat (Mallord *et al.* 2012a), food resources (Whytock *et al.* 2015), phenology (Mallord *et al.* 2017) or rates of nest predation (Mallord *et al.* 2012b) that could explain the population decline. Expansion to study areas in Devon and the New Forest, where the rate of decline had been more severe, increased knowledge but again failed to find the cause of decline; variation in nest predation rates did not seem to be related to vegetation structure (Bellamy *et al.* 2018) and temporal fluctuations in weather did not affect productivity. Extensive colour-marking of individuals allowed between-year survival and recruitment to be measured.

The Wood Warbler is one of an increasing number of long-distance, Afro-Palearctic migrants to have undergone severe declines in the UK (Vickery *et al.* 2014). The ecologies of these species, which may face adverse impacts on breeding and wintering grounds, and migration routes between, pose a real challenge to researchers.

53. Wood Warbler *Phylloscopus sibilatrix*, Dumfries & Galloway, May 2014.

Work in Ghana and Burkina Faso discovered that wintering Wood Warblers are found in degraded forest, secondary woodland and even in well-wooded farmland, rather than pristine forest (Mallord *et al.* 2016), and that further degradation of wintering areas did not lead to reduction in their use, making it unlikely that habitat loss on the wintering grounds is a major problem (Mallord et al. 2018). More recently, the use of GPS tags in a collaborative project with the BTO has provided more insight into migration routes and wintering grounds (Burgess *et al.* 2022); yet, after 13 years of high-quality research, the hunt for the cause of Wood Warbler decline goes on.

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The success of individual projects demonstrates the value of a structured approach to species conservation, with research into causes of decline then leading to practical conservation actions intended to enable recovery

management towards a sustainable end point. This process is often iterative and cyclical as we adapt research and recovery projects in light of our findings. Progressing species through this simplified framework can be challenging, and obstacles to progress may be met at any stage. In addition, the conservation action and resources needed may change as a species responds to initial action. One of the great challenges to achieving ultimate success through such programmes is finding a sustainable end point that does not require continued conservation resources, as they may come at the expense of investment in other species or wider nature recovery priorities. Of the projects delivered under AfBiE, only the translocation of Red Kites has resulted in a sustainable recovery with no further investment required, other than 'business as usual' conservation (e.g. ensuring that legislation protecting the species from illegal persecution is enforced and that highly toxic second-generation rodenticides are used responsibly). Other species are likely to remain either Policy Dependent or Conservation Dependent (see box 1), at least until wider aspirations for nature recovery are achieved.

Here, we have not tackled the knotty issue of what represents successful recovery for a priority species. While the current population of Eurasian Bitterns is higher than it has been for at least 200 years, and Red Kites are seemingly on the way to being abundant across much of England, for other species our definition of what represents success is a status much diminished on previous levels. For example, Stone-curlews were once widely distributed across the lighter soils of England as far north as Yorkshire, and Marsh Harriers bred commonly on our upland moorland. The current aspiration to prevent further loss in declining widespread species, such as House Sparrow *Passer domesticus* and Skylark, would still leave England with millions of pairs fewer than earlier within our lifetimes – but is it really

feasible to return such species to their previous levels, and if so, what levels do we aspire to? Do we wish to return to levels at the beginning of the farmland bird indicator (i.e. 1970), for example, or do we wish all their populations to be either stable or increasing? The work of both organisations in identifying what is termed 'Favourable Conservation Status' for individual species will hopefully provide a firmer foundation for such assessments and judgements, but choices are at some point value based.

Lessons learnt

We are continuing to learn how best to deliver conservation through SRPs, but our journey within this programme has taught us much. This includes:

- As resources are limited, an evidence-based, strategic approach to selecting which species to target is essential. This should be followed by appropriate action planning to identify what needs to be done to facilitate recovery.
- An understanding of the drivers of decline and factors that limit populations, and what actions will address these issues, is an essential pre-requisite to undertaking interventions. However, sometimes a species may be in such dire straits it is necessary to work on all fronts, simultaneously, without perfect knowledge. We see this as acceptable providing its success is continuously evaluated and an 'adaptive management' approach is employed.
- The Species Recovery Curve (box 1) provides a useful conceptual model for guiding and tracking progress consistently across projects and species but, importantly, is based on measuring actions and not necessarily outcomes. While presented as a linear model, in reality, many feedback loops exist as projects progress.
- Obtaining the required population-level response depends upon

impacting a sufficiently high proportion of the national population with targeted interventions. This means that it is typically easier, given limited resources, to make progress for scarcer, range or habitat-restricted bird species.

- Even if effective solutions have been identified, successful conservation delivery for more widespread species relies on having effective policy mechanisms in place that can be rolled-out across a significant proportion of the species' range by key stakeholders (e.g. farmers and other land managers). Understanding the practicality of action and the motivation of stakeholders will be vital to achieving progress.
- The future role of advice provision is clear: farmers and foresters will need to be aware of what wildlife resource occurs on their landholdings and what the conservation priorities are, as well as what management techniques can be deployed to deliver species recovery alongside production. The role of agronomists was critical in delivering the rapid intensification of UK farmland to achieve food security after the Second World War. Now advice needs to incorporate environmental needs, including ecology as well as agronomy, to ensure that the right interventions are put in place, in the right places, at the right scale, for the right species.
- Short- or medium-term thinking is unlikely to deliver successful and lasting species' recoveries; a longer-term perspective is needed, including a commitment to long-term funding and an ability to adapt to changing circumstances.
- Working in partnership on a programme of recovery projects brings many benefits – more can be achieved, at a greater scale, by working together and synergistically. In addition, funding from multiple partners buffers against short-term fluctuations, thus maintaining project continuity. Partners can support each other's organisational priorities and the flexibility to move resources between projects at short notice is

advantageous and reduces overheads. The benefits of the AfBiE partnership have extended well beyond what has been delivered for any individual species, as the RSPB and NE have developed shared priorities and shared delivery approaches that have shaped the way the bird conservation has been planned and deployed in England over the last quarter century.

- It is important to have exit strategies with clear plans for delivering the 'business as usual' action required for those species that will require ongoing support.
- It is also important to evaluate project progress with adequate intervention monitoring so that we learn from research and conservation actions, and limited resources are used wisely.

Future action for birds in England

We believe that AfBiE has demonstrated how an evidence-based approach to delivering species recovery can succeed in preventing further extinctions in England and improving the status of priority species. This is especially true when combined with wider conservation action at the landscape scale, and addressing environmental issues, such as land-use change, pollution and development pressures at local, regional and national scales. The challenge continues to grow, however, with more bird species being considered threatened, and ongoing declines in common and widespread bird species.

Ultimately, we believe that meeting the challenge is dependent on two key factors: increased funding for conservation action to enable delivery at sufficient scale; and the mainstreaming of conservation action into all governmental policies, wider society and business. Greater investment is required, so NE's new *Species Recovery Programme Capital Grant Scheme*,

which is spending J14.5 million on 63 projects over 2023–25 (with 33 birds being targeted for action), is most welcome but is not a silver bullet to solve resource problems in the medium to long term. Funding for AfBiE has shown a welcome upturn over the last two financial years, with NE contributions rising to approximately J800,000 in 2022/23 and J1.2 million in 2023/24, linked to the adoption of the Government's new statutory targets for species recovery. This has enabled new species to be included within the programme, as well as increases in the scope and extent of action for some species that are already part of AfBiE, but progress on these has not been assessed here as it is too early to see the benefits of these additional resources. This is encouraging – though still massively below what is needed to recover birds and nature in England in a broader sense to meet national nature targets.

54. House Sparrow *Passer domesticus*, Norfolk, May 2015.

In addition to funds devoted directly to conservation projects, both for ongoing projects and for new priority species, there is the crucial need for a

much larger investment in landscape-scale conservation and for agri-environment measures, which, in England, will now be delivered through the developing Environmental Land Management Scheme (ELMS). We know that nature-friendly land management solutions can enable the recovery of widespread bird species (and other taxa) if delivered at scale and with the right options being deployed in the right places, but to date the delivery has not reached the required scale (see, e.g., box 7). While they have not yet recovered to their former status, we have been able to reverse the declines for Stone-curlews and Cirl Buntings.

We believe that this paper makes a strong case for continuation of a species-based approach to conservation in England and elsewhere through partnerships focused on delivering informed action for threatened species that may otherwise continue to decline and be lost altogether. Embedded within an approach to deliver wider environmental benefits, these projects can stop loss, and promote and achieve recovery. However, the resources available to date have been insufficient for the task of recovering nature more broadly, outside of a handful of rare and range-restricted bird species. For true success in meeting the societal demand for nature recovery, as well as meeting the targets set at national and international levels, a step change in resourcing and action for conservation is required in England.

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