Title: The Environment Act – Terrestrial Biodiversity Targets **IA No:** N/A **RPC Reference No:** N/A **Lead department or agency:** Department for Enviornment, Food, and Rural Affairs (Defra) **Other departments or agencies:**	**Impact Assessment (IA)** **Date:** 28/04/2022 **Stage:** Consultation **Source of intervention:** Domestic **Type of measure:** Secondary legislation **Contact for enquiries:** biodiversity.targets@defra.gov.uk

Summary: Intervention and Options

RPC Opinion: Not applicable

Cost of Preferred (or more likely) Option (in 2019 prices)			
Total Net Present Social Value	**Business Net Present Value**	**Net cost to business per year**	**Business Impact Target Status**
£11,892m	N/A	N/A	N/A

What is the problem under consideration? Why is government action or intervention necessary?

Biodiversity is declining at an unprecedented rate. Since 1970 there has been a 68 percent decrease in population sizes of mammals, birds, amphibians, reptiles, and fish worldwide[1]. We value species and ecosystems in their own right, but they also contribute to our wellbeing and economic prosperity. In order to halt this decline, transformative change is needed in England and globally, at an urgency and scale that only governments can effectively implement. Rapid declines in biodiversity will not be addressed by the market, which does not fully account for the value of biodiversity to society and will underprovide for biodiversity without government intervention.

What are the policy objectives of the action or intervention and the intended effects?

Setting legally binding targets will create a legal obligation to deliver policy outcomes to halt the decline of biodiversity. Their legal force will also help to drive policy action and behaviour in a way that principles and objectives have not to date. The long timeframes for the targets will support consistent, long-term policy commitments to deliver lasting environmental outcomes. Legally binding targets for biodiversity will also provide a strong public signal that tackling biodiversity loss is a government priority. Legally binding targets demonstrate government commitment to ambitious domestic action that leads the way internationally and aims to encourage international partners to make similarly ambitious commitments. The government proposes a suite of biodiversity targets, which will work together to create lasting change for both habitats and species. These, together with other Environment Act targets, will collectively improve the natural environment by tackling the drivers of biodiversity loss such as poor air and water quality.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Option 0 - Do Nothing - This would put the Secretary of State in breach of his legal obligations under the Act and would not drive the action necessary to address the loss of biodiversity.

Option 1 - One long-term legally binding target, and the 2030 species abundance target – This would meet obligations under the Act. However, there is no single measure for biodiversity and without sufficient mitigations, a single legally binding target could lead to the creation of perverse incentives.

Option 2 (Preferred Option) - A suite of long-term legally binding targets, and the 2030 species abundance target – A suite of long-term targets will support consistent and long-term policy commitments required to tackle biodiversity decline.

The Preferred Option is Option 2. Setting a suite of biodiversity targets aligns with the 25 Year Environment Plan and will maximise benefits for biodiversity. A substantial evidence review has been undertaken, considering several possible targets. This Impact Assessment does not consider the impacts of all the possible combinations of targets and ambition levels that have been considered, but instead is focussed on a comparison between Option 2 (the recommended suite of targets) and Option 0 (Do Nothing). More detail on the possible indicators and ambition levels is provided in the biodiversity Evidence report.

An alternative to setting targets is not considered as there is a legally binding commitment for government to set targets.

[1] Almond REA, Grooten M, Petersen T. (Eds). Living Planet Report 2020 - Bending the curve of biodiversity loss. WWF, 2020. Available from: https://livingplanet.panda.org/en-gb

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** Targets and policies will be reviewed periodically in line with Environment Act (2021) requirements				
Is this measure likely to impact on international trade and investment?		No		
Are any of these organisations in scope?	**Micro** Yes	**Small** Yes	**Medium** Yes	**Large** Yes
What is the CO_2 equivalent change in greenhouse gas emissions? (Million tonnes CO_2 equivalent)		**Traded:**	**Non-traded:** 138 mtCO_2	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible SELECT SIGNATORY: N/A Date: N/A

Summary: Analysis & Evidence

Policy Option 2

Description: Legally binding Environment Act targets for species abundance, species extinction risk, and wider habitats outside of protected sites (Preferred Option).

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2020	Time Period Years 2022-2100	Net Benefit (Present Value (PV)) (£m)		
			Low: -	**High:** -	**Best Estimate:** £11,892

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	-		-	**-**
High	-		-	**-**
Best Estimate	-		£260	**£3,231**

Description and scale of key monetised costs by 'main affected groups'

The costs of introducing the targets will depend on how the targets are implemented. This Impact Assessment does not put forward all the possible government policies that could potentially help to meet the targets over a 20-year period. Further detail on the costs and impacts of individual future policies that contribute towards the targets will be assessed within their individual future Impact Assessments. However, this Impact Assessment does present an illustrative assessment of the potential costs associated with setting these targets, based on an assessment of the main actions that would need to be implemented to enable the targets to be achieved.

The primary monetised costs are the costs of direct conservation actions deemed necessary to meet the targets. For the species targets (£206.6m average annual cost), the most substantial costs are the cost of adopting land management approaches that support widespread species, the cost of remedial actions to improve the condition of protected sites, and targeted actions to support threatened species. For the wider habitats target (£53.8m average annual cost), the costs incurred are related to the creation, restoration, and maintenance of wildlife-rich habitats.

The targets put a duty on government, not business, and it is expected that the contribution of the private sector will primarily be captured in other regulatory Impact Assessments (e.g., Biodiversity Net Gain (BNG)) or voluntary.

Other key non-monetised costs by 'main affected groups'

The cost assessment focuses on the direct costs of the actions identified as being required to meet the targets. The targets have been designed to be based on existing data and so there are not substantial additional monitoring costs required to report against the targets as currently framed, assuming that data continues to be collected by volunteer-run monitoring schemes and that protected sites monitoring continues to be funded. As set out in Evaluation section, the monitoring and evaluation programme for biodiversity targets is currently being scoped; this will consider the need for any additional data collection. There will be additional indirect costs in addressing the wider drivers impacting on habitats and species which have not been quantified. A proportion of these wider costs will be covered in the Impact Assessments for other legally binding Environment Act targets, such as water quality and air quality, which are key pressures on biodiversity outcomes. The costs of meeting the biodiversity targets could increase considerably if the water and woodland cover targets are not met.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price) (2023-2042)	Total Benefit (Present Value) (2022-2100)
Low	-		Optional	**-**
High	-		Optional	**-**
Best Estimate	-		£591	**£15,123**

Description and scale of key monetised benefits by 'main affected groups'

Total discounted benefits are split between carbon sequestration (£5,303m), air quality regulation (£740m), physical health (£2,171m) and recreation (£6,909m). It was possible to monetise these benefits due to existing data and evidence.

Other key non-monetised benefits by 'main affected groups'

The following benefits are not monetised in this Impact Assessment: the direct benefits of policy interventions targeting species recovery (improving mean species abundance and reducing extinction risk), mental health, water supply, flood regulation, noise reduction, food security, pollination, volunteering and education. This is due to a lack of data, gaps in the evidence base and because the locations for future conservation actions are not specified by the biodiversity targets. It is likely that the non-monetised benefits are considerable. We are seeking to develop our assessment of the benefits of biodiversity targets for the Final Stage Impact Assessment. Additionally, to avoid double counting between the biodiversity targets discussed in this IA and other Environment Act targets, the costs and benefits that arise from other targets are referenced in this IA, but they are not included quantitatively in this assessment.

Key assumptions/sensitivities/risks	**Discount rate (%)**	First 30 years: 3.5% After 30 years: 3% After 75 years: 2.5%

The scale of costs and who bears them will depend on future policy decisions made over the twenty-year period covered by the targets. This Impact Assessment illustrates the potential resources required to meet the targets, based on a package of key actions, but does not provide a detailed analysis of all policy levers that could be introduced in future years.

More generally, there is a high degree of uncertainty around how biodiversity outcomes can be realised through specific actions. The analysis in this Impact Assessment should be seen as an assessment of the cost of programmes of action that can be reasonably judged to be capable of delivering the targets, rather than the costs of meeting the targets with a high degree of certainty. If the monitoring and evaluation of progress reveals that additional actions or policy changes are required in future, the costs of meeting the targets may be higher. The detailed impacts of any future policies which affect biodiversity outcomes will be analysed in more detail as and when they are introduced.

A key assumption underpinning the cost analysis of the targets concerns the future unit costs of delivering, at sufficient scale, the land management actions necessary to achieve them. For the wider habitats target, the assumptions for cost per hectare created or restored are based on evidence from recent conservation projects as well as agri-environment scheme payment rates. For the species abundance targets, the estimated unit costs for the actions required have been informed by what is currently known about the payments for species-friendly actions under the Sustainable Farming Incentive (which are based on the cost of the action plus income forgone).

The following sensitivity analysis has been undertaken to explore the impact of modifying these assumptions:

- Varying the assumptions around the package of actions required to achieve the set of target outcomes.
- Varying the percentage of wildlife-rich habitat that is created rather than restored under wider habitats target (creation is generally more expensive than restoration).
- Varying the unit costs for actions required for the species abundance targets and habitats target; and
- Varying the assumption on the coverage of species friendly land management options on farmed land that is required.

The impact of wider pressures, such as climate change, has not been fully factored into this IA. Further analysis is being undertaken on the impact of climate change on the achievability of the biodiversity targets and the resulting impacts on the costs and benefits (see sensitivity analysis section of this IA for further detail).

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			**Score for Business Impact Target (qualifying provisions only) £m:** N/A
Costs: 0	**Benefits:** 0	**Net:** 0	

Contents

Executive Summary

The Environment Act 2021 commits the government to setting at least one long-term, legally binding target for biodiversity, as well as a 2030 species abundance target. Long-term, legally binding targets will drive action and create certainty. The suite of proposed biodiversity targets considered in this Impact Assessment (Preferred Option) are to:

- halt the decline in species abundance by 2030.
- increase species abundance by at least 10% by 2042, compared to 2030 levels.
- improve the England-level GB Red List Index for species extinction risk by 2042, compared to 2022 levels.
- create or restore in excess of 500,000 hectares of a range of wildlife-rich habitats outside protected sites by 2042, compared to 2022 levels.

Setting a suite of biodiversity targets aligns with the 25 Year Environment Plan and will maximise benefits for biodiversity. A substantial evidence review has been undertaken, considering several possible targets. This Impact Assessment does not consider the impacts of all the possible combinations of targets and ambition levels that have been considered, but instead is focussed on a comparison between Option 2 (Preferred Option) and Option 0 (Do Nothing). More detail on the possible indicators and ambition levels is provided in the biodiversity Evidence report.

This Impact Assessment does not put forward all the government policies that could help to meet the targets over the entire 20-year period. It presents an illustrative assessment of the potential costs and benefits associated with setting these targets to give a sense of the resources that may be required and the scale of benefits that could be delivered. This is based on quantifying the costs of the main conservation actions that can be reasonably judged to be capable of delivering the targets rather than specific policy levers that could potentially deliver them. The impacts of any specific future policies that would support the delivery of the targets will be assessed in more detail on a case-by-case basis as and when they are introduced, and depend on future decisions on government policy. Further detail on the costs and impacts of these policies will be assessed within their individual Impact Assessments.

The direct costs to businesses of legally binding biodiversity targets will be dependent on how the targets are implemented. The targets themselves put a duty on government, not business, and it is expected that the contribution of the private sector will primarily be captured in other regulatory Impact Assessments (e.g., Biodiversity Net Gain) or voluntary. While regulatory levers could create additional costs to businesses, any future regulatory change will be subject to an Impact Assessment in which the costs to businesses will be explored.

1. Problem under consideration and rationale for intervention

Biodiversity is the variety of all life on Earth**.** It includes all species of animals and plants, and the natural systems that support them. Biodiversity enables ecosystems to flourish and supplies the wide variety of services that we rely on including our food system, carbon capture and storage to regulate the climate, flood alleviation, improved water, air and soil quality and recreational access to nature. Without these services, life as we know it would not be possible.

According to the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) global biodiversity is declining faster than at any other time in human history[2]. Since 1970 there has been a 68 percent decrease in population sizes of mammals, birds, amphibians, reptiles, and fish worldwide[3]. In Great Britain alone, 15% of species are threatened with extinction[4]. Biodiversity loss poses risks and uncertainty to our economies, health and wellbeing, with impacts including, but not limited to, risks to food security, increasing risk of transmission of diseases from animals to humans, and exacerbating the vulnerability of coastal areas to floods and storm surges.

The decline in biodiversity requires significant action in England and globally to halt the loss of species and habitats, with an urgency and at a scale that requires an active role for the government, private sector, civil society, and individuals. There are increasing calls from the public, businesses, politicians, civil society and the media for action[5]. The UK will support a range of ambitious goals and targets to be adopted as part of the post-2020 Global Biodiversity Framework at the Convention on Biological Diversity COP15 (CBD COP15). UK domestic biodiversity policy is devolved and each of the four countries produces their own plans or strategies to support international commitments.

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[2] Brondizio ES, Settele J, Díaz S, Ngo HT. Global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. IPBES, 2019. Available from www.ipbes.net/global-assessment

[3] Almond REA, Grooten M, Petersen T. (Eds). Living Planet Report 2020 - Bending the curve of biodiversity loss. WWF, 2020. Available from: https://livingplanet.panda.org/en-gb/

[4] Hayhow DB, Eaton MA, Stanbury AJ, Burns F, Kirby WB, Bailey N, Beckmann B, Bedford J, Boersch-Supan PH, Coomber F, Dennis EB, Dolman SJ, Dunn E, Hall J, Harrower C, Hatfield JH, Hawley J, Haysom K, Hughes J, Johns DG, Mathews F, McQuatters-Gollop A, Noble DG, Outhwaite CL, Pearce-Higgins JW, Pescott OL, Powney GD and Symes N (2019) The State of Nature 2019. The State of Nature partnership. Available from: https://nbn.org.uk/wp-content/uploads/2019/09/State-of-Nature-2019-UK-full-report.pdf

[5] Hayhow DB, Eaton MA, Stanbury AJ, Burns F, Kirby WB, Bailey N, Beckmann B, Bedford J, Boersch-Supan PH, Coomber F, Dennis EB, Dolman SJ, Dunn E, Hall J, Harrower C, Hatfield JH, Hawley J, Haysom K, Hughes J, Johns DG, Mathews F, McQuatters-Gollop A, Noble DG, Outhwaite CL, Pearce-Higgins JW, Pescott OL, Powney GD and Symes N. The State of Nature 2019. The State of Nature partnership. 2019 Available from www.rspb.org.uk/our-work/state-of-nature-report/

In England, new legally binding targets on biodiversity will help deliver the government's commitment to leave the environment in a better state than we found it. This is part of the wider government response to the clear and scientific evidence, and growing public demand, for a step-change in environmental protection and recovery. The Act, alongside our Agriculture and Fisheries Acts, sets a new legal foundation for government action to improve the environment.

When the targets are set in statute, they will become a key vehicle for delivering the vision set out in the 25 Year Environment Plan, setting a new domestic framework for environmental governance. The targets aim to help create a more sustainable and resilient economy and enhance well-being and quality of life.

Market failures

We value our species and ecosystems in their own right, but they also contribute to our wellbeing and economic prosperity. Rapid declines in biodiversity are negative externalities that will not be addressed by the market, which does not fully account for the value of biodiversity to society. The Dasgupta Review[6] told us that nature's worth to society – the true value of the various goods and services it provides – is not reflected in market prices because much of it is open to all at no monetary charge. The Review confirms that economic prosperity and environmental protection are two sides of the same coin. Securing the economic and physical wellbeing of future generations means halting the decline of biodiversity by the end of this decade[7].

Private activities which negatively impact biodiversity, such as pollution, can have social costs which are not taken into account (negative externalities).

In the absence of government intervention this can lead to the over-exploitation of biodiversity, which ultimately costs society more than it benefits it. Legally binding targets for the environment seek to address these negative externalities.

Biodiversity may also be considered a national public good. People cannot usually be prevented from enjoying biodiversity (non-excludability), and a person's enjoyment of biodiversity does not deplete its availability to others (non-rivalry). This means there is not enough incentive for individual investment in biodiversity.

The benefits of biodiversity take many forms and are widespread, which makes it difficult to quantify value and ensure that the people who benefit pay proportionately. This means

[6] Dasgupta, P. The Economics of Biodiversity: The Dasgupta Review. Abridged Version. (London: HM Treasury). 2019. Available from: www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

[7] HM Treasury. The Economics of Biodiversity: The Dasgupta Review Government Response, 2021. Available from: www.gov.uk/government/publications/the-economics-of-biodiversity-the-dasgupta-review-government-response

that, despite the important economic and social benefits of biodiversity, in the absence of government intervention, the market will underprovide biodiversity and undervalue the important benefits it provides to our economy, health and wellbeing.

Investment in biodiversity pays off

The Dasgupta review found that human demands for goods and services "far exceed" nature's capability to support its production. As a result, it estimated that the stock of natural capital per head of the world population decreased by 40% between 1992 and 2014[8]. This trajectory is unsustainable and demonstrates the need for long term targets to halt and reverse this trend. The government has set ambitious targets in the past, such as the Climate Change Act[9], which provided successful signals to industry about the direction of travel and where to invest. The Environment Act targets will act as similar market signals. Investing in nature helps to protect and enhance social benefits; for example, benefit-cost ratios of around 4:1 have been estimated for investment in wetland creation, upland peatland restoration and intertidal habitat creation[10]. Grassland and heathland management and restoration also offers substantial value, particularly through public access and pollination services. Pollinators contribute more than £500 million a year to UK agriculture, through improving crop quality and quantity.

Action is required now, as the cost of biodiversity recovery will likely increase substantially if the government waits. According to the Dasgupta review: "by acting now, the cumulative social cost of stabilising [global] biodiversity intactness by 2050 is estimated to be US$7 trillion (equivalent to around 8% of global GDP in 2019). Delaying action by 10 years would more than double the social cost, at approximately US$15 trillion (equivalent to around 17% of global GDP in 2019). The difference in costs between acting now and later is equivalent to 9% of global GDP (in 2019)[11]."

Existing regulation and legislation

Section 40 of the Natural Environment and Rural Communities Act 2006, as amended by the Environment Act 2021, places a duty on all public authorities to consider the actions they can take, consistent with the exercise of their functions, to conserve and enhance biodiversity, and then take that action.

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[8] Dasgupta, P. The Economics of Biodiversity: The Dasgupta Review. Abridged Version. (London: HM Treasury). 2021. Available from: www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

[9] The UK Government. Climate Change Act (2008).

[10] Natural Capital Committee. The state of natural capital: protecting and improving natural capital for prosperity and wellbeing. 2015. Available from: www.gov.uk/government/publications/natural-capital-committees-third-state-of-natural-capital-report

[11] Dasgupta P. The Economics of Biodiversity: The Dasgupta Review. Abridged Version. (London: HM Treasury). 2019. Available from: www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review

Within England the principal pieces of legislation which afford protection to species are the Conservation of Habitats and Species Regulations (2017) and the Wildlife and Countryside Act (1981). Broadly this legislation protects certain species through the prohibition of activities which could impact on their conservation status. Legal protection for species is used where this addresses a potential impact on a species e.g., through development, persecution etc. However, there are species (particularly plants, invertebrates, and widespread generalists) for which legal protection is not required to underpin their recovery but nevertheless require action to support their conservation.

There are also legal protections for habitats, such as Sites of Special Scientific Interest (SSSIs) designated under powers derived from the Wildlife and Countryside Act 1981 (as subsequently amended); and Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated under the Conservation of Habitats and Species Regulations 2017 (as amended).

There are several existing policy commitments to address the decline in biodiversity. In the 25 Year Environment Plan, the government committed to:

- restoring 75% of our one million hectares of terrestrial and freshwater protected sites to favourable condition, securing their wildlife value for the long term.
- creating or restoring 500,000 hectares of wildlife-rich habitat outside the protected site network, focusing on priority habitats as part of a wider set of land management changes providing extensive benefits.
- taking action to recover threatened, iconic or economically important species of animals, plants and fungi, and where possible to prevent human-induced extinction or loss of known threatened species in England and the Overseas Territories.

The Environment Act provides an opportunity to build upon existing commitments by setting long-term statutory targets for biodiversity. This is further supported by the Agriculture Act, which sets out a new system of payments to reward farmers for their role as environmental stewards, and the Fisheries Act which helps to support a thriving and sustainable fishing industry whilst safeguarding the health of our oceans.

2. Rationale and evidence to justify the level of analysis used in the Impact Assessment (proportionality approach)

There is no single measure of 'biodiversity'; different ecosystems, habitats and species are changing in diverse ways which cannot all be captured in a single index. However, several biodiversity indicators have been produced at a UK and England level as part of the 25 Year Environment Plan Outcome Indicator Framework, which provides a robust starting point and includes a set of indicators to track environmental change. Additionally, the government consulted stakeholders in 2018 during the process of defining headline indicators for the Outcome Indicator Framework and identified several new biodiversity indicators. The government has used these indicators, as well as exploring other sources of evidence, to help develop the range of targets proposed in the consultation on Environment Act targets. Throughout target development and this Impact Assessment, the best available evidence has been used, but a high degree of uncertainty remains.

Whilst the UK has some of the best biodiversity data in the world, there are gaps in both data and our knowledge[12]. There is a good broad understanding of the type of actions that are required to meet the proposed biodiversity targets, and previous evaluation evidence that can inform future policy (for example the evaluation of Biodiversity 2020[13]), but biodiversity is highly complex and dynamic, with a high degree of inherent uncertainty. This limits the government's ability to comprehensively measure changes and to make accurate quantitative predictions of the future of all habitats and species. The government wants to improve this over time, including as part of the regular framework of reporting against the progress towards these targets under the Environmental Improvement Plan.

2.1. Approach to assessing the costs and benefits of introducing targets against the counterfactual

This Impact Assessment sets out some of the options considered[14]. The Impact Assessment is focussed on a more detailed appraisal of the Preferred Option (Option 2 – introducing legally binding targets), compared to the counterfactual (Option 0 – do nothing).

[12] Further detail on these gaps and further information on the indicators for each proposed target can be found in the biodiversity Evidence report.

[13] UKCEH (2019) Evaluation of Biodiversity 2020, available at http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20409&FromSearch=Y&Publisher=1&SearchText=Biodiversity%202020&SortString=ProjectCode&SortOrder=Asc&Paging=10

[14] See the biodiversity Evidence report for the full range of options considered.

The costs and benefits included in this Impact Assessment are primarily based on external research produced by ICF Consulting Services Limited (ICF) and Economics for the Environment Consultancy (eftec), who were commissioned by Defra to assess the costs and benefits of meeting notional long-term biodiversity targets, with various levels of ambition explored for each potential target. This project[15] has undergone an internal review and is currently undergoing external peer review. Any recommendations from the peer review will be considered in detail as we develop the Final Stage Impact Assessment, along with any additional evidence that is gathered as part of the Consultation process.

The ICF and eftec research was commissioned in 2020, when thinking about the wording of the targets and the feasible levels of ambition was at an early stage. Therefore, the potential targets explored in the ICF and eftec report were similar in scope to the proposed targets in Option 2, but do not align exactly in terms of timelines and ambition. This includes the 2030 species abundance target.

To assess costs and benefits of the notional targets, it was necessary to define and quantify the actions needed to meet a target at a particular level of ambition. For the outcome-based targets, the authors, advised by Natural England, formed a judgement as to the type, pace and extent of action required to achieve a certain outcome, defining a low, medium and high ambition package of actions. For example, ICF and eftec's medium and high ambition scenarios assume certain key actions would need to be undertaken over the initial three to five years rather than a longer timeframe as modelled in a low ambition approach (with investment staggered over 10 years). However, there was a high level of uncertainty because models quantifying the effect of conservation action on the outcomes were lacking. Therefore, the link between the low, medium and high packages of actions, and the notional levels of ambition/outcome (as they were defined for the purposes of the study) was imprecise and indicative only.

Since the ICF research was commissioned, further evidence and analysis has been undertaken to explore the feasibility of meeting different levels of ambition. A series of expert workshops were undertaken to assess the feasibility of meeting different levels of ambition and the policies and actions that would be required. Natural England and the UK Centre for Ecology and Hydrology (UKCEH) have also undertaken trajectory modelling for the targets. The modelling, as set out in the biodiversity Evidence report, shows that the 2030 species abundance target in particular will be highly challenging to meet, and requires a step change in the level of conservation action.

Given the scale of the challenge identified for the proposed suite of targets in Option 2, and the inherent uncertainty about the responsiveness of biodiversity outcomes to specific policy actions, the Impact Assessment adopts the highest cost package of actions modelled in the ICF and eftec report. This assumes that an ambitious and fast-paced package of actions would be required to meet the targets. This has been judged to be the

[15] ICF and eftec, 2021. Costs and Benefits of England's Biodiversity Ambition - publication forthcoming.

most appropriate assumption, particularly given the adoption of the highly ambitious target to halt the decline of species abundance by 2030. It is assumed that the 2030 species abundance target is on the trajectory of the long-term species abundance target, to then bend the curve and begin to recover nature.

Sensitivity analysis has been undertaken to explore uncertainties and assumptions in the analysis. One sensitivity test assumes 100% of wildlife-rich habitat will be created (as opposed to a mix of creation and restoration). Another sensitivity test explores the impact of varying the scale of species friendly actions that is assumed to be required to meet the target, on the costs of meeting the species targets. There are also sensitivity tests that assume higher unit costs are required to deliver actions judged as necessary to meet the wider habitats target and species abundance targets. Further detail on this is provided in the sensitivity analysis section of this Impact Assessment.

The impacts of introducing targets on the UK economy will heavily depend on how the targets are implemented. For example, the cost of meeting a habitat creation or restoration target would depend on a wide range of factors including the types of habitats created or restored, the location and alternative uses for that land and the approach used to create or restore the habitat. It will also depend on the balance of policy levers used, for example, the mix of regulation, incentives, or market-based approaches.

This Impact Assessment does not put forward all the government policies that could help to meet the targets over the entire 20-year period. It presents an illustrative assessment of the potential costs and benefits associated with setting these targets – based on the main actions required rather than specific policy levers that could potentially deliver them - to give a sense of the resources that may be required and the scale of benefits that could be delivered. This is based on quantifying the costs of the main conservation actions that can be reasonably judged to be capable of delivering the targets.

As of yet no decisions have been made regarding policy pathways. Therefore, the impacts of any specific future policies that would support the delivery of the targets will be assessed in more detail on a case-by-case basis as and when they are introduced. Further detail on the costs and impacts of these policies will be assessed within their individual Impact Assessments.

3. Description of options considered

Option 0 – Do Nothing

Setting non-statutory targets or relying on the 25 Year Environment Plan commitments will not be sufficient to incentivise the step change in policy needed to halt nature's decline, without which nature would continue on a downwards trajectory. Crucially, legislative targets will hold successive governments to account on specific, measurable changes and delivery action in a way that non-legally binding goals will not. In this way, the 2030 species abundance target embodies the government's commitment to leave the environment in a better state. Non-statutory targets are also unlikely to provide sufficient certainty and market signals to spur private investment or innovation on the same scale as legal targets. Doing nothing and not setting statutory biodiversity targets would put the Secretary of State in breach of his legal obligations under the Act. This is therefore not a viable option.

Therefore Option 0 is not the preferred option. As explained below, legally binding targets are needed to ensure policy objectives are met.

Option 1 – One long-term legally binding target, and the 2030 species abundance target

Legally binding targets drive action and create long-term certainty

Setting legally binding targets will create a legal obligation for government to deliver policy outcomes to halt the decline of biodiversity, and an independent review process (by the Office for Environmental Protection (OEP)) will monitor progress. Their legal force will also help to drive policy action and behaviour in a way that principles and objectives have not to date.

The long-term nature of the targets will support consistent policy commitments to deliver on environmental objectives. If a long-term target is missed, then government must, within 12 months of confirming that it missed it, publish and lay before Parliament, a "remedial plan." This plan must explain why the target was missed and set out the steps the government intends to take to achieve the target as soon as reasonably practicable. This requirement, as with other aspects of the Environment Act's targets framework, will form part of environmental law, and will therefore fall within the OEP's remit.

Legally binding targets for biodiversity will also provide a strong external public signal that tackling biodiversity loss is a government priority. Long-term targets can help provide

businesses with confidence in the market to develop long-term investment frameworks[16]. These legally binding targets, together with the policies and incentives to implement them, will create certainty and direction required to help drive industry investment in environmental improvement, cleaner practices and technologies and innovation to tackle habitat creation and restoration, and species loss.

Legally binding targets also demonstrate our commitment to ambitious domestic action that leads the way internationally, aiming to encourage international partners to make similarly ambitious commitments. Demonstrating credible and urgent efforts is important to the UK's international leadership role, including as host of COP26 and in helping to drive the agreement of a new global framework for biodiversity at the CBD's 15th Conference of the Parties (COP15) planned to take place later this year[17]. The UK wants COP15 to be a turning point for countries around the world to collectively commit to ambitious targets and actions which will bend the curve of biodiversity loss globally by 2030.

One long-term legally binding target, and the 2030 species abundance target

The Environment Act commits the government to setting at least one long-term biodiversity target, and a target to halt the decline of species abundance by 2030. There is no single measure for biodiversity. Further detail on indicator choice and development is included in the biodiversity Evidence report. In setting a single long-term target, this IA has assumed that it would be a long-term target for species abundance, as the continuation of the 2030 species abundance target and the apex target for biodiversity. As an outcome-based target, it would be expected to drive wide-ranging improvements to the state of nature.

Species abundance is a good proxy for wider ecosystem health and the species abundance indicator is the preferred indicator for the long-term and 2030 species abundance targets. Further information on the indicators considered can be found in the biodiversity evidence report. The species abundance indicator covers approximately 1,000 species.

There is a risk that setting a single target could be narrow in focus and allow the creation of perverse incentives. The abundance indicator can only include species for which we have sufficiently robust data (approximately 1,000 species). While the abundance target is intended to drive an overall increase in population sizes, it may not, for example, help certain rare and threatened species. Setting a suite of biodiversity targets aims to capture a wider, more holistic picture of the state of nature, and maximise the benefits for wider environmental recovery. For this reason, Option 1 – to set only one long-term legally binding target and the 2030 species target is not the preferred option.

[16] Green Finance Strategy. Transforming finance for a greener future. HM Government. 2019. Available from: www.gov.uk/government/publications/green-finance-strategy

[17] Convention on Biological Diversity. www.cbd.int/cop/

Option 2 – A suite of long-term legally binding targets, and the 2030 species abundance target – Preferred Option

The government proposes a suite of legally binding biodiversity targets

The Environment Act commits the government to setting at least one long-term, legally binding target for biodiversity, as well as a 2030 species abundance target. Long-term, legally binding targets will drive action and create long-term certainty. As set out previously, this will also lead to benefits across the economy, public health and wellbeing, and in basic ecosystem services.

The government proposes a suite of biodiversity targets to drive the required change. As explained in section 4 below, these targets are complementary, with each supporting the achievement of the other targets. The proposed suite of targets will drive wide-ranging improvements and work together to create lasting change for both habitats and species. They will be supported by other Environment Act targets, and together will collectively improve the natural environment by tackling the drivers of biodiversity loss, including poor air and water quality.

The government proposes to set targets to:

- halt the decline in species abundance by 2030.
- increase species abundance by at least 10% by 2042, compared to 2030 levels.
- improve the England-level GB Red List Index for species extinction risk by 2042, compared to 2022 levels.
- create or restore in excess of 500,000 hectares of a range of wildlife-rich habitats outside protected sites by 2042, compared to 2022 levels.

This is the preferred option.

4. Policy objective

A suite of legally binding biodiversity targets will drive wide-ranging improvements to the state of nature. They will deliver a range of ecosystem services including not only habitats for species, but flood alleviation, carbon sequestration, pollination and improvements in wellbeing. Climate change and biodiversity loss are interlinked problems, and nature-based solutions to tackle climate change will also be important for reducing pressures on biodiversity and increasing investment in habitats.

The suite of targets will work together to ensure biodiversity is recovered. Recovering wildlife will require more habitat; in better condition; in bigger patches that are more closely connected, in line with Lawton principles and our objectives for the Nature Recovery Network[18]. Species abundance gives us information about wider ecosystem health, with good quality, connected habitats supporting a greater abundance of species.

A complementary habitat creation and restoration target will support the recovery of a wide range of species beyond those included in the species abundance target. As the habitat needs of some species conflict with the needs of others, despite being part of the same ecosystem, a suite of approaches to habitat creation is necessary to avoid improving the status of some species at the cost of others. For example, lowland heath in Southern England, where management focussing on improving butterfly populations led to a decline in ant populations. The wider habitats target will deliver an ecosystem more resilient to both natural and human-made pressures, including climate change, that supports the species targets in a sustainable way and contributes to nature recovery.

All proposed targets are SMART

- **Specific:** All targets have a specific and clearly defined level to be achieved.
- **Measurable:** The method for objective measurement is clear and repeatable in each case, allowing results to be reproduceable within reason.
- **Achievable:** To be sure that each target is ambitious, yet achievable, the historic pace of change of our indicators and potential future trends was analysed. Also, an independent expert advice group (Biodiversity Targets Advisory Group) who provided scrutiny of the evidence-based approach for targets was created. The Secretary of State is satisfied that the target can be met.
- **Relevant:** All targets will track something of real-world importance to biodiversity.

[18] Lawton JH, Brotherton PNM, Brown VK, Elphick C, Fitter AH, Forshaw J, Haddow RW, Hilborn, S, Leafe RN, Mac, GM, Southgate MP, Sutherland WJ, Tew TE, Varley J, Wynne GR. Making Space for Nature: a review of England's wildlife sites and ecological network. Report to Defra. 2010. Available from: https://webarchive.nationalarchives.gov.uk/ukgwa/20130402170324/http:/archive.defra.gov.uk/environment/biodiversity/documents/201009space-for-nature.pdf

- **Time-bound:** All targets are time-bound with a specific date by which it must be achieved, creating a clear deadline to focus policy action.

Environmental Improvement Plans (EIP) must contain five-yearly interim targets for each long-term legally binding target. EIPs must set out the steps the government intends to take to improve the natural environment, which is expected to include measures needed to meet its long-term and interim targets. These requirements will also apply to the 2030 species abundance target. This will allow for an ongoing assessment of whether the government is on track to meet its long-term target ambitions. The first review of the EIP will be completed by January 2023.

4.1. Species abundance and extinction targets

In the 25 Year Environment Plan, the government committed to taking action to recover threatened, iconic, or economically important species of animals, plants and fungi and, where possible, to prevent human induced extinction or loss of known threatened species. Trends show that, overall, species populations have declined over the last 40 years[19].

Once the post-2020 Global Biodiversity Framework is agreed, Parties to the CBD will be expected to set their own national level targets and to report what contributions they have made. In England, we are leading the way internationally by setting key targets in law. Our 2030 species target demonstrates our commitment to ambitious domestic action, and we hope it will encourage international partners to make similarly ambitious commitments.

Setting targets to support species recovery will help us to engage people and galvanise public support for the recovery of biodiversity. Addressing species declines will see multiple benefits, with species targets not only helping us to prioritise species or groups of species for recovery but also to support and prioritise actions for the improvement of habitats and the ecosystem services they provide. A species target is therefore not just about the outcome for said species but about promoting broader investment and action in the environment from NGOs, landowners and others, including the wider public, to deliver a range of benefits to society and the economy.

A species abundance target and species extinction risk target will work together. The species extinction risk target will capture changes in populations of very rare species as well as more widespread species, to complement the species abundance targets.

The proposed species targets are:

- **2030 species abundance target**: to halt the decline in species abundance by 2030.

[19] England biodiversity indicators. 4a. Status of priority species: relative abundance. Available from www.gov.uk/government/statistics/england-biodiversity-indicators

- **Long-term species abundance target:** to increase species abundance by at least 10% by 2042, compared to 2030 levels.
- **Long-term species extinction risk target**: to improve the England-level GB Red List Index for species extinction risk by 2042, compared to 2022 levels.

4.2 Wider habitats target

The wider habitats target will be the most sensitive target to change as it directly measures action to create and restore habitat outside of the protected site network. Successful habitat restoration would be a clear indicator that positive change has been made and would help to guide future progress and action. Our evidence base shows that where we facilitate habitat creation or restoration, and where we address pressures, we see the signs of nature recovery.

The government wants to increase the number of wildlife-rich habitats in England. Many of our wetlands, woodlands, grasslands and coastal habitats have been lost. While losses have slowed, many natural and semi-natural habitats are in poor condition and not recovering as we would like. Patches of habitat are also often very fragmented, isolated, and too small to sustain thriving communities of species into the future. Historical data on species abundance and distribution consistently link species loss with habitat loss or degradation. Recovering biodiversity will require more habitat, in better condition, in bigger patches that are more closely connected[20].

In the 25 Year Environment Plan, the government committed to create or restore 500,000 hectares of wildlife-rich habitats outside of protected sites as part of a Nature Recovery Network, to complement and connect our best wildlife sites. A statutory target of in excess of 500,000 hectares is expected to drive a net increase in creation and restoration of 'wildlife-rich' habitats across a range of habitat types. Maximising the habitat created and restored will support delivery of the 2030 species abundance target. Our ambition is to exceed 500,000 hectares, in order to drive wider nature recovery. Setting a legally binding target to support the 25 Year Environment Plan commitment will help us to act on habitat loss, to create and restore habitats outside of protected sites and bring habitats into appropriate management to recover biodiversity.

The proposed target is:

- **Wider habitats target:** to create or restore in excess of 500,000 hectares of a range of wildlife-rich habitats outside protected sites by 2042, compared to 2022 levels.

[20] In line with Lawton principles. The Natural Choice: Securing the value of Nature. Defra. 2011. Available from: www.gov.uk/government/publications/the-natural-choice-securing-the-value-of-nature

5. Summary and Preferred Option with description of implementation plan

The suite of legally binding biodiversity targets will be laid in secondary legislation by 31 October 2022, alongside the long-term Environment Act targets in other priority areas. The Environment Act requires the government to produce Environmental Improvement Plans, which must contain five-yearly interim targets for each legally binding target. They must also set out the steps the government intends to take to improve the natural environment, which we expect would include measures needed to meet its targets. This will involve developing and delivering a mix of policy levers to ensure sufficient action is taken to support the delivery of the biodiversity targets. The government will be required to report on progress towards achieving the targets every year.

The Office for Environmental Protection (OEP) will hold the government to account on progress towards achieving the targets and every year can recommend how the government can make better progress. The government must respond to these recommendations, which will be published and laid before Parliament. The OEP will have the power to bring legal proceedings if the government breached its environmental law duties, including its duty to achieve the biodiversity targets.

There are a number of existing and future initiatives and policy levers that will contribute to progress towards meeting the Environment Act biodiversity targets. Many of these will also support delivery of wider Environment Act targets and other government environmental objectives, while in some cases balances and trade-offs will need to be sought. Research and analysis will be required to improve the existing evidence base and help ensure action is directed appropriately. An effective monitoring and evaluation programme will be essential for tracking our progress towards the targets, understanding the contribution of individual policy levers and adopting a dynamic, adaptive management approach that supports the system towards delivering the target outcomes.

6. Monetised and non-monetised costs and benefits of each option (including administrative burden)

This section provides a cost benefit analysis of the preferred option (Option 2 – introducing a suite of legally binding targets), compared to the counterfactual (Option 0 – Do Nothing).

All the costs and benefits are estimated in 2019 prices and discounted to 2020 present values. This policy will come into effect in 2022, so we have therefore appraised the costs and benefits over a 78-year appraisal period from 2022 to 2100. This is to ensure consistency with other Environment Act targets where possible, allowing the impacts of all targets to be comparable.

Option 0: Do Nothing – the counterfactual

This option represents the continuation of the status quo with no legally binding Environment Act targets. To understand the baseline, the government commissioned research from ICF which examined biodiversity funding[21]. The research estimated the value of total biodiversity funding for the financial years from 2019/20 to 2024/25.

Protecting and improving biodiversity is a complex challenge, requiring efforts from a wide range of organisations within and outside of government. Defra's strategy for conserving biodiversity in England has long depended on partnerships involving statutory, voluntary, academic and business sectors, and there are a vast range of initiatives that contribute to progressing biodiversity outcomes. This means the policy landscape is complex and it is difficult to get a comprehensive picture of the expenditure and other resources that contribute towards our biodiversity goals. ICF used a number of methods to gather data on expenditure from a wide range of organisations including public sector funding (such as Agri-environment schemes), private sector funding and funding from environmental NGOs.

It is likely that the level and the composition of funding streams will change over the twenty-year target period. Due to the uncertainties involved, the estimated funding for the 2021/22 financial year is used in the baseline option analysis, as this is the best evidence available[22].

[21] ICF (2021) – publication forthcoming.

[22] Public sector funding: Legacy Agri-environment funding (i.e., Countryside Stewardship schemes and Higher-Level Environment Schemes), Farming in Protected Landscapes Programme, Nature for Climate funding, the Green Recovery Challenge Fund, Flood and Coastal Resilience Innovation Programme, Flood

Wider habitats

The baseline level of funding for the wider habitats target can be explored using the ICF funding analysis. Funding has been categorised as either public sector, private sector, or NGO funding. The funding analysis estimated that in the 2021/22 financial year £251m will be spent on wider habitats outside of protected sites actions, with £165m attributable to the public sector, £44m to the private sector and £42m to NGOs.

As the wider habitats target is action-based rather than outcome-based, the current rate of annual habitat creation is used to estimate the area of habitat created/restored in the absence of a legally binding wider habitats target. It is assumed that there will be a continuation of average delivery rates for Outcome 1B of Biodiversity 2020[23]. The current rate of delivery is approximately 16,595 hectares of habitat per annum[24]. This means that over the 20-year target period it is estimated that, in the absence of a legally binding wider habitats target, approximately 331,900 hectares of habitat will be created or restored[25].

Species abundance and species extinction risk

In the ICF 2021/22 funding analysis, it was not possible to distinguish between funding that was aimed at increasing mean species abundance and funding to reduce the risk of species extinction. This is because funding aimed at either will likely support the other. As such the funding analysis is presented as a total for species. This means that it is not possible to present separate baseline options for the species abundance and species extinction risk targets.

Defence Grant-in-Aid, Water Environment Improvement Fund, Natural Environment Investment Readiness Fund; High Speed 2 Biodiversity Woodland Fund

Private sector funding: Water related funding (PR19), and other private sector funding, E.g., Airport Community Trust Funds.

NGO funding: funding from a wide range of NGOs captured via primary data collection through a targeted questionnaire and secondary data collection from NGO annual returns to the Charity Commission website.

[23] Outcome 1B (For habitat and ecosystems on land, including freshwater environments): more, bigger and less fragmented areas for wildlife, with no net loss of priority habitat and an increase in the overall extent of priority habitats by at least 200,000 ha. Biodiversity 2020: A strategy for England's wildlife and ecosystem services. Defra. 2011. Available from: www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services

[24] This assumption is in line with the wider habitats outside of protected sites target trajectory. See biodiversity Evidence report for further details.

[25] Delivered through the following mechanisms: Highways England Biodiversity Plan, National Trust Estate management. Environment Agency habitat creation programme, Forestry Commission – habitat creation, Forestry Commission – restoration of Ancient Woodland Sites, Forestry - Open Habitats Programme, Local Planning Authorities – Green Infrastructure delivery recorded by Natural England, Mineral Companies Sire Restoration, External Partners and Natural England – Restoration/Creation of priority habitats and arable field margins.

Additionally, 2021/22 funding for protected sites is included in the species baseline. This is because, for species abundance and species extinction risk ambitions to be realised, action on improving the condition of protected sites in line with the 25 Year Environment Plan goal of restoring 75% of our terrestrial and freshwater protected sites to favourable condition is vital. In a workshop held with stakeholders and experts to assess the desirability and feasibility of potential species targets, improving the condition of protected sites was consistently seen as essential for delivery of the species targets.

The funding analysis estimated that in the 2021/22 financial year £577m will be spent on species and protected sites actions, with £420m attributable to the public sector, £19m to the private sector and £138m to NGOs. This is used as the estimate of baseline annual spending that supports species under the status quo.

Option 2: A suite of long-term legally binding targets, and the 2030 species abundance target (Preferred Option)

The impacts of introducing legally binding biodiversity targets relative to 'Option 0 - Do nothing' will depend on the specific policies introduced to meet the targets. This Impact Assessment does not put forward all the government policies that could potentially be introduced over the next 20 years to meet the targets. Instead, it presents an illustrative assessment of the potential costs and benefits associated with setting these targets, based on the key conservation actions that would be required. The exact costs and benefits will depend on how the targets are implemented.

Meeting these targets will be complex. It will need government, land managers, the public, the private sector, and NGOs to all work together and contribute. It is expected that environmental land management schemes will play a crucial role by providing incentive payments to reward farmers and land managers for actions that support biodiversity across the farmed landscape. We are also looking at how to increase private sector investment in nature, and a Nature Recovery Green Paper published in March explores the possibility of regulatory changes to support biodiversity.

The distribution of impacts on different groups and sectors will also depend on how the targets are implemented.

Scale of costs

To inform the development of potential Environment Act biodiversity targets, independent research was commissioned from ICF and eftec which examined 'The Costs and Benefits

of England's biodiversity ambitions'[26]. This research forms the basis of the costs and benefits explored below.

This research provides estimates of the costs of direct conservation actions for three long-term target areas:

- Creating and/or restoring priority habitats outside of protected sites.
- Increasing species abundance.
- Preventing species extinctions.

The researchers worked with the relevant experts in Natural England to develop a methodology for assessing the costs of each of the potential legally binding biodiversity target areas set out above. For each target area, a judgement was made on the necessary actions that would be required to achieve the targets. The costs of these actions were then estimated; further detail is provided in the respective target areas below. The actions deemed necessary to achieve the targets are based on reasoned judgement by experts rather than on scientific evidence. However, these policy pathways are illustrative, and no decisions have yet been made on appropriate delivery policies.

The three targets are interlinked, and it is expected that action under one target will contribute towards the achievement of another target. To ensure that actions are not costed multiple times under different biodiversity targets, actions that are required to achieve the wider habitats target were defined and quantified first. The actions defined and costs quantified under the species targets are therefore additional to those captured under the wider habitats target. Thus, the achievement of the species abundance target is contingent on successfully carrying out the actions identified as necessary to meet the wider habitats target. Similarly, the actions and costs of the species extinction risk target are additional to the other target areas.

All costs and benefits are assessed over the period 2022 to 2100 due to the long timeframes for the benefits to accrue for biodiversity conservation action. The costs and benefits are presented in 2019 prices and discounted to 2020 present values where monetised. This is to ensure consistency with other Environment Act targets where possible, allowing the impacts of all targets to be comparable.

Wider habitats

The costs and benefits of a legally binding wider habitats target have been informed by ICF and eftec research mentioned above, the methodology of which has been set out in detail in the below section. The wider habitats target is to create or restore in excess of 500,000 hectares of a range of wildlife-rich habitats outside of protected sites by 2042, compared to 2022 levels. The estimated costs of this target are examined below

[26] ICF and eftec, 2021. The costs and benefits of England's biodiversity ambitions – Publication forthcoming.

To calculate the costs of implementing a wider habitats target, the baseline level of habitat creation of 331,900 hectares (over 2023-2042 period) that was set out in the wider habitats 'Option 0 - Do nothing' was subtracted from the legally binding target of creating/restoring 500,000 hectares of wildlife-rich habitats. Thus, the target would require an additional 168,100 hectares of wildlife-rich habitats to be created or restored by 2042, compared to the projected amount that would be created under Option 0.

Due to the nature of the Environment Act targets setting process, there is inevitable overlap between some the actions needed to achieve different targets and subsequently the costs of achieving the targets. Woodland creation, which will contribute towards the 17.5% woodland cover target, will also contribute to the wider habitats target. The woodland cover target assumes that 80% of woodland creation will be broadleaf. This implies deciduous woodland creation of 8,000 hectares per year from 2025 under the woodland cover target. It is not known how much deciduous woodland creation will occur outside of Sites of Special Scientific Interest (SSSIs), but 88% of current deciduous woodland is outside SSSIs.

As a simplification, the analysis assumes that this same percentage will apply to new woodland creation. It has been assumed that 7,000 hectares of woodland creation per year will count towards the priority habitats target. This equates to 140,000 hectares over the whole target period to 2042. To minimise the risk of double counting, the monetised costs and benefits of this woodland creation are only included in the woodland cover target and not in this Impact Assessment. If the woodland cover target is not met, the costs of meeting the wider habitats target is likely to increase

The wider habitats target is action-based. Therefore, the main direct conservation actions identified as necessary to achieving the target are creation, restoration and maintenance of wildlife-rich habitats outside of protected sites. The wider habitats target does not specify the required balance between habitat creation and restoration activities. The wider habitats target could potentially be met by any balance of creation and restoration activities. For the purposes of this cost benefit analysis, an equal 50:50 split of habitat creation and restoration by area has been assumed. This assumption is explored in the sensitivity analysis set out at a later point in this IA.

In the analysis, it is assumed that any restoration and/or creation activity will be carried out between 2023 and 2042, with an equal amount of priority habitat created and restored each year. This is an assumption made solely for analytical purposes and in practice may not be possible at the beginning of the target period. The wider habitat target is not prescriptive about the hectarage of habitat that needs to be created or restored each year and in reality, the area of habitat created/restored may be higher in later years. This could potentially have a small impact on the actual costs of this target. This will be considered further for the Final Stage IA.

Additionally, whilst the types of habitats that may contribute towards the target are known[27], the specific hectarage of each habitat type created and restored is not specified as part of the wider habitats target. For the purposes of this IA, it has been assumed that the targets will include a range of habitat types that are most amenable to area-based creation and restoration targets[28]. The creation mix follows a similar percentage breakdown of relevant habitats for England Biodiversity targets to Rayment (2017)[29]. The restoration mix is proportionate to current habitat area not in Countryside Stewardship, Higher Level Stewardship or Forestry Commission agreements. These assumptions will be considered further in the Final Stage IA.

The specific hectarage of each priority habitat type either created or restored is estimated by multiplying the creation and restoration percentage of each priority habitat type by the total hectarage that would be created and restored each year. The cost of maintaining existing priority habitat outside of protected sites has been included as well as the cost of maintaining additional habitat that has been created or restored.

Unit creation, restoration and maintenance costs for each priority habitat type were collected by the researchers from a range of sources including a literature review, data from habitat creation and restoration projects funded by LIFE, National Lottery Heritage Fund (NLHF) and the Environment Agency and interviews of staff in Natural England, the Environment Agency, the Forestry Commission and environmental NGOs. The cost of maintaining existing priority habitat outside of protected sites has been included as well as the cost of maintaining additional habitat that has been created or restored.

The average annual creation, restoration, and maintenance costs of meeting the target have been calculated by multiplying the estimated area of habitat created, restored, and maintained each year by the unit cost per hectare of creation and restoration according to habitat type (see table 1).

Table 1 shows the estimated average annual cost between 2023-2042 of meeting the wider habitats (outside of protected sites) Environment Act target. It is estimated that the average annual creation cost of meeting the wider habitats target is £13.2m. As described

[27] See the consultation document for list of habitats suggested.

[28] The following habitats have been included within the scope of this analysis: Coastal Saltmarsh, Coastal Sand Dunes, Coastal Vegetated Shingle, Maritime Cliff and Slope, Mudflats, Saline Lagoons, Lowland Calcareous Grassland, Lowland Dry Acid Grassland, Lowland Meadows, Purple Moor-Grass and Rush Pastures, Upland Calcareous Grassland, Upland Hay Meadow, Lowland Heathland, Mountain Heaths and Willow Scrub, Upland Heathland, Limestone Pavement, Traditional Orchard, Blanket Bog, Coastal and Floodplain Grazing Marsh, Lowland Fens, Lowland Raised Bog, Reedbeds, Upland Fens Flushes and Swamps.

[29] To avoid double counting deciduous woodland has been excluded as the costs and benefits of creating such habitat has been captured in the woodland cover target. Assessing the costs of Environmental Land Management in the UK. Final Report. A report for the RSPB, the National Trust and The Wildlife Trust. Rayment. 2017. Available from: https://nt.global.ssl.fastly.net/documents/assessing-the-costs-of-environmental-land-management-in-the-uk-final-report-dec-2017.pdf

above it is assumed that the other half of the target will be met by the restoration of priority habitats outside of protected sites. The estimated average annual restoration cost of meeting this target is £2.5m. Creation costs are considerably higher than restoration costs and if more of the target is met through creation activities, the estimated average annual cost will be much higher. The average annual maintenance cost of meeting the wider habitats target is estimated to be £31.0m. The maintenance costs include the cost of maintaining existing priority habitats and additional priority habitats created or restored.

Following on from the approach taken in GHK (2006[30] and 2011[31]), a 15% mark up on the costs of meeting this target has been added. This is to take into account central planning, administration, and co-ordinating costs.

Familiarisation costs to business of the wider habitats target have not been estimated as this Impact Assessment does not put forward all of the possible government policies that could potentially help to meet this target. Further detail on the familiarisation costs of individual future policies that contribute towards this target will be assessed within their individual future Impact Assessments.

Table 1*:* The estimated average annual cost between 2023-2042 of meeting the proposed legally binding wider habitats target, £m.

Action	Cost, £m
Restoration	2.5
Creation	13.2
Maintenance	31.0
Central planning, administration and co-ordinating	7.0
Total	53.8

[30] UK Biodiversity Action Plan: Preparing Costings for Species and Habitat Action Plans. Costings Summary Report. Revised Report to Defra and Partner. GHK Consulting LTD and RPS. 2006. Available from: www.cbd.int/financial/finplanning/uk-speciescost.pdf

[31] Benefits of SSSIs in England and Wales - Summary. GHK. 2011. Available from: http://randd.defra.gov.uk/Document.aspx?Document=sssis-benefits-non-technical-summary.pdf

Proportion of costs borne by businesses

The target places a duty on government and does not itself lead to any direct costs to business.

Any future costs to businesses of meeting a legally binding wider habitats target will be dependent on how the target is implemented. However, it is expected that some of the costs of meeting the habitat target will be borne by the private sector, for example, this may be voluntary contributions or to comply with other regulatory measures. Any future regulatory change will be subject to an Impact Assessment in which the costs to businesses will be explored. Similarly, any contributions made under the framework of existing regulations –for example Biodiversity Net Gain - would already be captured in other Impact Assessments and are not an impact of the introduction of this target. In this way, this target alone does not create additional costs to businesses.

While the target itself does not lead to a cost to business, to understand the proportion of the costs of meeting the habitat target that are likely to be met by businesses rather than government, existing expenditure on habitat creation and restoration has been examined. The ICF funding analysis estimated that in the 2021/22 financial year, 66% of funding for wider habitats activities was from the public sector and 17% originated from the private sector (with the remaining 17% funding coming from NGOs)[32].

If the 2021/22 breakdown of wider habitats funding between the public and private sector is used to estimate the relative proportion paid by government and businesses, the estimated average annual cost to government of meeting the wider habitats target is £35.3m and the estimated contribution by businesses is £9.4m.

However, it is likely that in the future an increasing amount of wider habitats activities will be financed by the private sector. HMG has set an ambitious target to raise at least £500m in private finance for nature's recovery every year by 2027, rising to more than £1bn a year by 2030[33]. This could mean that businesses' contribution towards meeting this target could be greater in future.

To create and restore habitats requires targeted action from landowners and managers, particularly in the agricultural sector given 70% of UK land is farmed. This will be supported in part by agri-environment schemes, which will offer land managers the opportunity to be financially rewarded for taking actions that contribute to the delivery of the targets. The three new, complementary environmental land management schemes will offer choice of support for more regenerative approaches to farming and the creation or restoration of habitats in appropriate areas. The Government intends to ensure that all

[32] ICF (2021) – publication forthcoming.

[33] Autumn Budget and Spending Review. Policy paper. HM Treasury. 2021. Available from: www.gov.uk/government/publications/autumn-budget-and-spending-review-2021-documents/autumn-budget-and-spending-review-2021-html

environmental land management schemes are fully compatible with the blending of public and private finance, and that public money does not “crowd out” private investment. Enabling private revenue streams and investment will give farmers and land managers more opportunity to derive an attractive return from delivering ecosystem services.

The housing and development sector will contribute to delivering the targets, primarily through Biodiversity Net Gain which will require developers to offset the impact of their development on biodiversity by enhancing or creating habitat. The Biodiversity Net Gain Impact Assessment estimates that 15,900 ha of non-developed land is to be developed annually. Biodiversity Net Gain aims to deliver a minimum of 10% of habitat gain. The impact assessment further estimates an annual creation or enhancement of between 1,551 and 17,060 ha. The expected impacts of Biodiversity Net Gain are set out in more detail in the published BNG Impact Assessment.

Water companies also manage substantial areas of land and will be able to contribute to meeting all the proposed targets. The Environment Act water targets will be key to addressing off-site pressures through reducing water, and other related, pollution. Further details on the impacts of the water targets are included in the water targets Impact Assessment.

Species targets

- **to halt the decline in species abundance by 2030 and increase species abundance by at least 10% by 2042, compared to the 2030 levels.**
- **to improve the England-level GB Red List Index for species extinction risk by 2042, compared to 2022 levels.**

The costs and benefits of the proposed legally binding species Environment Act targets have been informed by the ICF and eftec research, whose methodology is set out in detail below.

The proposed species targets are outcome-based, and so in order to assess the costs and benefits of meeting them, it was first necessary to define a package of actions required to achieve a certain outcome. The researchers’ assessment of the package of actions required was informed by advice from experts in Natural England and is supported by the findings of the expert elicitation workshops (for more information see the biodiversity Evidence report). The main actions required to achieve the species targets, which have been costed for this IA, are:

1. widespread adoption of land management which supports the recovery of species (to increase the abundance of wider countryside species that are more likely to be reliant on farmed habitats).
2. an increase in targeted investment for threatened species.
3. increased investment in protected sites.
4. a step change in habitat creation and restoration.

The costs of a step change in habitat creation and restoration are already captured under the wider habitats target, set out in the previous section. To reduce the risk of double counting costs, for the species targets, we have only included the costs of the other three sets of actions required to deliver the species targets; habitat creation or restoration is excluded here.

Familiarisation costs to business of species targets have not been estimated as this Impact Assessment does not put forward all of the possible government policies that could potentially help to meet these targets. Further detail on the familiarisation costs of individual future policies that contribute towards these targets will be assessed within their individual future Impact Assessments.

Species friendly land management

In this IA, it is assumed that widespread adoption of species-friendly land management is required to increase the abundance of wider countryside species that are more likely to be reliant on farmed habitats. This would include land management actions such as creating hedgerows and providing food and cover for farmland birds.

While the costs of delivering species friendly land management necessary to achieve the targets will depend on the specific policy levers used, for the purposes of the analysis, the unit costs have been estimated based on the latest available information regarding the Sustainable Farming Incentive[34] (which are based on the cost of the actions plus income forgone) to illustrate the scale of resources that may be required to deliver the species targets.. Each payment rate is associated with differing extent of Agri-environment action at farm level, with higher payment rates relating to additional actions being carried out.

The Sustainable Farming Incentive proposals outline standards which will deliver actions assumed to benefit species. Sustainable Farming Incentive proposals are still in development and could be subject to change. The proposed Sustainable Farming Incentive standards outlined in ICF and eftec (2021) that were available at the time the research was undertaken are as follows[35]:

- **Hedgerow standard** – Includes prescriptions for management and cutting, buffer strips and hedgerow trees.
- **Arable standard** – Requires management of a proportion of arable area to provide resources for farmland birds, pollinators and other beneficial insects. This includes nesting and cover areas; insect and flower rich habitat; winter seed food and/or unharvested low input cereal, overwintered stubbles. Also

[34] www.gov.uk/government/publications/sustainable-farming-incentive-scheme-pilot-launch-overview/sustainable-farming-incentive-defras-plans-for-piloting-and-launching-the-scheme

[35] The Sustainable Farming Incentive standards and related payment rates have been updated since the ICF and eftec (2021) research was undertaken. Over the next few months, further work is ongoing to refine our biodiversity targets Impact Assessment, before the Final Stage IA.

includes requirements for nutrient management and, for higher payments, enhanced wildlife habitat.

- **Improved grassland standard** – Includes sward management, uncut margins, buffers around trees, nutrient management plan, taking areas out of management, and for higher payments specific rules on silage cutting, clover, ditches, nutrients, slurry, and manures.
- **Semi-improved/ unimproved grassland standard** – Includes rules on management of nutrients and weeds, buffering field trees, uncut margins, avoiding poaching and overgrazing, ditch management, sward management, and for higher payments management of rushes, scrub, hay meadow, wildflowers, and water levels.

Although some evidence does exist relating to the response of birds within the Farmland Bird Index (FBI) and Agri-environment schemes at the local level (see biodiversity Evidence report for more information), there is limited evidence on the relationship between action taken under Agri-environment schemes and changes in species abundance at national level.

Modelling undertaken by UKCEH, and RSPB (see the biodiversity Evidence report) based upon empirical data on the response of farmland birds to higher level Agri-environment schemes in England found that around 40% of farms would need to adopt nature friendly farming to halt the decline of farmland birds by either 2030 or 2040 and that this would need to increase to around 65% to halt and reverse the decline of farmland birds by 2030 and put it on an upward trajectory. In order to return the FBI to its 2022 value by 2040 it would require a steady increase to 68% in 2040. The modelling assumed that these farms would adopt options similar to the old Higher Level Stewardship scheme in which a small proportion of the land area was covered by nature-friendly options (e.g., as sown field margins). The modelling was based only on farmland birds in the FBI, rather than all species in the abundance indicator. The authors note that these estimates should be treated with caution given the high uncertainty in the data and assumptions made but that they provide a sense of the step-change in action required.

In ICF and eftec (2021), it was assumed that 80% of hedgerow, arable land, improved grassland and unimproved/semi-improved grassland would need to be covered by similar standards and associated prescriptions (with a small proportion of each farm used for nature friendly options) to deliver improvements to species abundance. This assumption was informed by expert judgement from Natural England about the scale of action required in order to meet the species abundance targets. However, there is uncertainty around this assumption. It is worth noting that an 80% coverage rate could be ambitious to achieve.

For the purposes of this Consultation Stage IA this assumption from ICF and eftec (2021) - that coverage of species-friendly land management options would be adopted on 80% farmed land, with a small proportion of land for each farm used for nature friendly options - has been adopted. However, given the high level of uncertainty, sensitivity analysis has

also been undertaken, assessing the costs of meeting the target if a lower coverage of species friendly land management options on farmed land is sufficient to meet the species abundance targets; this is explained in more detail in sensitivity test 4.

There is also uncertainty around the assumed unit costs to deliver these species friendly management options. While the assessment assumes fixed unit costs per hectare based on Sustainable Farming Incentive payments (which are based on estimated costs of delivering the action and income forgone), it is possible that the future average unit costs of delivering the activities at the required scale may be higher than assumed. To address this uncertainty, the impact of higher unit costs for species friendly land management actions is explored further in sensitivity test 3.

To estimate the annual cost of implementing widespread uptake of species friendly land management measures, the area/length of land in each standard has been multiplied by the land area required and the relevant unit cost.

Targeted investment for threatened species

The types of targeted species actions that are included in the targeted species investment cost estimates include:

- Field survey work and species status assessment work.
- Research into species ecology/pressures/means of recovery.
- Field trial of management options.
- Habitat/site management actions.
- Policy and legislative actions.
- Advisory actions.
- Species protection work.

There is a lack of evidence linking actions to outcomes for species and for this IA it has not been possible to model the effect of specific targeted actions on the outcomes of specific species. For a subset of threatened species though, Natural England do have an existing database assessing the actions required for each species and the associated cost. For the purposes of this analysis, it has been assumed that the average costs for other species requiring targeted action will be similar to the average costs for the subset of species that Natural England have existing cost estimates for.

To calculate the direct conservation cost of meeting this target, the average cost per species has been multiplied by the number of species requiring targeted action. There is uncertainty around how many species will require targeted action over the target period. For the purposes of this IA, it is assumed that over the 20-year target period the number of species that will require targeted action will be 2500, based on Natural England advice to inform the ICF and eftec project (2021). These assumptions will be considered further in the Final Stage Impact Assessment.

Additionally, Natural England estimated that the cost of future of the number of species that require targeted species action will be £150,000 annually over a 10-year period (between 2023 and 2032)[36].

Increased investment in protected sites

While Option 2 (the preferred option) does not include a legally binding protected sites target, improving site condition will be a core part of achieving our species abundance and extinction risk targets. [For example, protected sites have been shown to have positive impacts on the abundance of rare and habitat specialist bird species included in the Breeding Bird survey[37]. The Breeding Bird survey data is included in the species abundance indicator.] Advised by Natural England, actions necessary to achieve the 25 Year Environment Plan goal of restoring 75% of terrestrial and freshwater protected sites to favourable condition were identified. This IA therefore assumes that it will be necessary to carry out protected sites actions in order to achieve the species targets.

The protected sites actions monetised in this cost benefit analysis include:

- Ongoing habitat management.
- Direct management or capital works.
    - Water related site management/restoration.
    - Diffuse pollution action.
    - Flood and coastal erosion risk management.
    - Habitat creation or restoration.
    - Additional direct management works.
- Management advice/plan.
    - Invasives/biosecurity plan.
    - Other plan/agreement.
    - Site Nitrogen Action Plan.
    - Advice.
- Investigation/research/monitoring.
- Other.

The remediation costs included in the analysis are based upon the cost estimates included in the Improvement Programme for England's Natura 2000 Sites (IPENS) study[38]. This study provides the only available cost estimates for SSSIs (Sites of Special Scientific Interest), which underpin the majority of European sites. The IPENS estimates informed

[36] Based on unpublished Natural England cost estimates.

[37] A Barnes et a., Do Conservation Designations Provide Positive Benefits For Bird Species And Communities? British Trust For Ornithology. 2022. This is a draft paper.

[38] Improvement Programme for England's Natura 2000 Sites (IPENS) Planning for the future Programme Report – a summary of the programme findings. Natural England. 2015. Available from: http://publications.naturalengland.org.uk/publication/5757712073752576

the costings set out in the Prioritised Action Framework (PAF) for England's Natura 2000 sites[39], which estimated costs of £1.3 to £1.4 billion over six years between 2015 and 2021.

The remediation costs to improve condition of protected sites is calculated by upscaling the PAF remediation costs for a subset of SSSIs to all SSSIs, by area.

The protected sites maintenance costs are estimated by multiplying the area of terrestrial SSSI (Sites of Special Scientific Interest) habitats[40] by the unit cost per hectare for each habitat[41].

As with the wider habitats target areas, the costs of the actions judged to be required to achieve the species targets are increased by 15% to account for central planning, administration, and co-ordination costs.

[39] Natura 2000. Format for a prioritised action framework (PAF) for Natura 2000. For the EU Multiannual Financing Period 2014-2020. England including marine to 12 nautical miles (2nd edition). (Version 30 March 2016). Available from: https://hub.jncc.gov.uk/assets/1b21d5b4-e87a-42db-a3af-894f10d40e4e

[40] As measured by the England Biodiversity indicators. www.gov.uk/government/statistics/england-biodiversity-indicators

[41] Unit cost estimates are taken from Rayment (2019). Rayment M. Paying for public goods from land management: How much will it cost and how might we pay? Final report. A report for the RSPB, the National Trust and The Wildlife Trusts. 2019. Available from: www.wildlifetrusts.org/sites/default/files/2019-09/Paying%20for%20public%20goods%20final%20report.pdf

Table 2: Estimated absolute average annual cost of meeting species targets between 2023-2042

Actions required to meet species targets		Average annual cost, £m
Species friendly land management	Hedgerow	68.5
	Arable land	234.7
	Improved grassland	116.5
	Semi-improved/unimproved grassland	83.4
Targeted investment for threatened species	Assessment of species requiring targeted investment	0.07
	Targeted species actions	46.4
Increased investment in protected sites	Maintenance of protected sites	72.3
	Remedial actions on protected sites	59.5
Central planning, administration and co-ordinating (15% mark-up)		102.2
Total		783.7

The estimated average annual costs presented in table 2 do not take into account the baseline level scenario, and action that will already likely occur in the absence of a legally binding species target. The estimated costs presented above are representative of all action judged to be necessary to achieve the species targets.

To understand the estimated *additional* costs of implementing a legally binding species targets, the baseline level of funding estimated for the 2021/22 financial year needs to be deducted from the estimated costs presented in table 2.

As explained in Option 0, the funding analysis estimated that in the 2021/22 financial year £577m will be spent on species and protected sites actions (that contribute to the achievement of the species targets). By deducting this baseline scenario level funding for the 2021/22 financial year from the total estimated annual cost of the species abundance and species extinction risk targets, it is estimated that the cost of the additional actions needed to achieve the species targets is £206.6m.

Proportion of costs borne by businesses

The ICF funding analysis estimated that in the 21/22 financial year 73% of funding for species-focused activities came from the public sector and 3% originated from the private sector (with the remaining 24% of funding coming from NGOs)[42].

It is possible that in the future an increasing number of wider species-focused activities will be financed by the private sector. The government has set an ambitious target to raise at least £500m in private finance for nature's recovery every year by 2027, rising to more than £1bn a year by 2030. This could mean that the contribution of business towards meeting this target could be greater in future. However, there is a high degree of uncertainty regarding future private sector funding for terrestrial biodiversity activities.

If the 21/22 breakdown of species funding and the protected sites funding which contributes towards the species targets between the public and private sector is used to estimate the relative proportion paid by government and businesses, the estimated cost to the public sector of meeting the species abundance and species extinction risk targets is £150.4m and the estimated contribution by businesses is £6.7m.

Legally binding species abundance and species extinction risk targets alone do not create additional costs to businesses. While regulatory levers could create additional costs to businesses, any future regulatory change will be subject to an Impact Assessment in which the costs to businesses will be explored. In the above the potential relative contribution of businesses has been estimated based upon existing funding levels from the private sector for wider species-based activities. However, this is not a direct cost to businesses.

Sensitivity analysis

As explained throughout the IA, there is a high degree of uncertainty around the costs and benefits of meeting the proposed targets. The most substantial uncertainty is the responsiveness of biodiversity outcomes to specific policy actions. To address some of the uncertainties highlighted throughout this IA, sensitivity analysis (detailed below) has been undertaken. The impact of climate change on the achievability, costs and benefits of the targets proposed in this IA is also discussed below.

Sensitivity 1: Balance of creation and restoration activities

In the wider habitats cost analysis presented earlier in this IA, it was assumed that there will be an equal balance between the hectarage of wildlife-rich habitats created and

[42] ICF (2021) – publication forthcoming.

restored. In reality, the proposed wider habitats target is not prescriptive about the balance between creation and restoration activities and therefore this proportion may vary.

Unit creation costs for the habitats included in the analysis exceed the unit restoration costs. Thus, if more than 50% of wildlife-rich habitat is created then the costs of meeting the wider habitats target will likely be higher than presented in the wider habitats cost analysis.

Table 3 illustrates the estimated average annual cost of meeting the wider habitats target through the creation of priority habitat only. For the cost estimates presented in table 3 it is assumed that no restoration activity takes place. Under this assumption the estimated average annual cost of meeting the wider habitats target is £63.1m, compared to an estimated £53.8m when the wider habitat target is met through 50% creation and 50% restoration activities.

Table 3: Estimated annual average cost of meeting the proposed wider habitats target via creation of wildlife-rich habitats only (2023-2042, £m)

Action	Cost, £m
Creation	26.5
Maintenance	28.4
Central planning, administration and co-ordinating	8.2
Total	63.1

Sensitivity 2: Higher habitat creation and restoration unit costs

For the wider habitats target, the payment rates (unit cost estimates) used to inform the costs estimates are based on evidence from recent conservation projects as well as Agri-environment payment rates.

It is possible that the average future unit costs to deliver those actions at sufficient scale may be higher than assumed in the IA. As such the impact of an arbitrary increase of 50% of the unit costs has been explored in table 4. This is to explore the potential impact on the average annual cost of meeting the wider habitats target if the average unit costs are higher.

Table 4: Estimated average annual cost of meeting the proposed wider habitats target with 50% higher unit costs (2023-2042, £m)

Action	Cost, £m
Creation	19.9
Restoration	3.8
Maintenance	46.4
Central planning, administration and co-ordinating (15% mark-up)	10.5
Total	80.6

Table 4 illustrates that the estimated average annual cost of meeting the wider habitats target when assuming a 50% increase in the habitat creation and restoration unit costs is £80.6m[43]. This is compared to an estimated £53.8m when the payment rates have not been arbitrarily increased by 50%.

Sensitivity 3: Higher unit costs for species abundance measures

As previously explained, a key requirement deemed necessary to achieve the species abundance targets is species friendly land management actions such as that incentivised by grassland, arable and hedgerow standards under the proposed Sustainable Farming Incentive scheme. In the species abundance cost analysis, unit costs have been informed by the intermediate and advanced Sustainable Farming Incentive payment rates.

It is possible that the average future unit costs to deliver sufficient coverage of species friendly land management options could be higher than has been assumed. As such an arbitrary increase of 50% of the unit costs has been considered in the sensitivity analysis. This is to explore the potential impact on the average annual cost of meeting the targets, if unit costs are higher.

[43] Assuming the wider habitats target is achieved by 50% creation and 50% restoration.

Table 5: Average annual cost of meeting the species targets with 50% higher payment rates

Actions required to meet species targets		Average annual cost, £m
Species friendly land management	Hedgerow	102.8
	Arable land	352.0
	Improved grassland	174.8
	Semi-improved/unimproved grassland	125.1
Targeted investment for threatened species	Assessment of species requiring targeted investment	0.07
	Targeted species actions	46.4
Increased investment in protected sites	Maintenance of protected sites	72.3
	Remedial actions on protected sites	59.5
Central planning, administration and co-ordinating (15% mark-up)		140.0
Total		1,073

Table 5 illustrates the estimated average annual cost of undertaking all the actions judged to be necessary to achieve the species Environment Act targets when assuming a 50% increase in the unit costs.

When taking into account the £577m of funding in the Do Nothing option it has been estimated that under this scenario the additional average annual cost of meeting the species abundance and species extinction risk targets is £495.9m, compared to baseline funding levels.

There is a high degree of uncertainty around the future unit costs of species friendly land management actions, thus this sensitivity test has been undertaken. Over the next few months, further work is ongoing to refine our biodiversity targets Impact Assessment, before the Final Stage IA.

Sensitivity test 4: Lower coverage of species friendly land management options on farmed land

As previously noted, there is a high degree of uncertainty around the aggregate scale of action necessary to deliver the required outcomes for species abundance. It is assumed in ICF and eftec (2021) that it would be necessary for 80% of hedgerow, arable land, improved grassland and unimproved/semi-improved grassland to adopt nature-friendly actions on a small proportion of their land similar to those proposed under the Sustainable Farming Incentive schemes, to deliver improvements to species abundance.

Modelling undertaken by UKCEH, and RSPB (see the biodiversity Evidence report) based upon empirical data on the response of farmland birds to higher level agri-environment schemes in England found that around 40% of farms would need to adopt nature friendly farming to halt the decline of farmland birds by either 2030 and that this would need to increase to around 68% by 2040 to return the FBI to its 2022 value by 2040.

Given the high level of uncertainty, this sensitivity test assesses the costs of meeting the target if a lower coverage of species friendly land management options on farmed land is required to meet the species abundance targets. Whilst the UKCEH and RSPB modelling and the ICF and eftec (2021) assumption (that for 80% of hedgerow, arable land, improved grassland and unimproved/semi-improved grassland, species friendly actions are adopted on a small proportion of each farm) are not directly comparable[44], the UKCEH and RSPB modelling indicates that lower coverage of species friendly land management options on farmed land could provide a substantial step change. As a result, for analytical purposes in this sensitivity test an alternative assumption - that it would be sufficient for 65% of hedgerow, arable land, improved grassland and unimproved/semi-improved grassland to provide species friendly actions on a small proportion of the land – has also been tested.

[44] The UKCEH and RSPB modelling refers to number of farms, whereas the ICF and eftec (2021) assumption is based on percentage of farmed land. The UKCEH and RSPB modelling is based on the farmland bird index rather than the species abundance indicator.

Table 6: Average annual cost of when it is assumed that 65% coverage of species friendly land management options on farmed land will help achieve the proposed species targets

Actions required to meet species targets		Average annual cost, £m
Species friendly land management	Hedgerow	55.7
	Arable land	190.7
	Improved grassland	94.7
	Semi-improved/unimproved grassland	67.8
Targeted investment for threatened species	Assessment of species requiring targeted investment	0.07
	Targeted species actions	46.4
Increased investment in protected sites	Maintenance of protected sites	72.3
	Remedial actions on protected sites	59.5
Central planning, administration and co-ordinating (15% mark-up)		88.1
Total		675.2

Table 6 illustrates the estimated average annual cost of undertaking all the actions judged to be necessary to achieve the Environment Act species targets when assuming 65% of hedgerow, arable land, improved grassland and unimproved/semi-improved grassland would need to be covered by species friendly actions (on a small proportion of their land), to deliver improvements to species abundance.

When taking into account the £577m of funding in the Do Nothing option it has been estimated that under this scenario the additional average annual cost of meeting the species abundance and species extinction risk targets is £98.1m, compared to baseline funding levels.

Sensitivity 5: Climate change

Some of the actions that are costed for targeted species interventions and for protected sites improvement relate to climate change (for example where further research has been identified as needed to explore the impacts of climate change on a particular species, or

where climate adaptation actions have been identified as necessary for a specific site). However, the overall impacts of climate change have not been explicitly taken into account in the analysis presented in this IA. It is likely that climate change will negatively affect the ability of species and habitats to recover. This may mean that actions additional to those as identified as required in this IA may be needed to meet the biodiversity targets. This could potentially substantially increase the costs of meeting the targets.

Further analysis has been commissioned to quantify the impact of climate change on the achievability and the costs and benefits of achieving the targets proposed in this IA. This analysis in currently being undertaken and will be available for inclusion in the Final Stage IA.

Early results of this analysis indicate climate change could affect the achievability of the proposed targets and lead to a considerable cost increase for delivery. The additional pressure of climate change on vulnerable species might increase the annual costs of maintaining abundance (of threatened species) by up to 28% (for all species)[45].

Additionally, the indicative analysis estimates that the impact of climate change on threatened species could potentially increase the annual cost of meeting the species extinction risk proposed target by up to 57%. It is estimated that the pressure of climate change on the annual costs of meeting the wider habitats target is much lower than for the proposed species targets with annual costs potentially increasing by up to 3%. As part of the regular reporting framework under the Environment Act, we will monitor the impact of climate change on our targets and consider how to respond.

Benefits

The benefits of biodiversity targets have been assessed using a natural capital approach[46]. The ICF and eftec (2021) research only provided a partial assessment of the benefits of the biodiversity targets based on pragmatism and on what it was possible to include given data limitations, the available evidence and due to the policy ambitions not being spatially defined. The benefit assessment focusses on the benefits from habitat creation and restoration inside and outside of protected sites. A quantified assessment of the other direct conservation actions judged as necessary for meeting the species abundance and species extinction risk targets has not been possible. The research provided a preliminary estimate of the potential scale of the benefits of the wider habitats and species targets (the latter through the contribution of protected sites actions to the species targets). It is likely

[45] The impact of climate change on species abundance depends on what is counted. The analysis presented only includes species for which are expected to experience declines as a result of climate change. Analysis is ongoing and is unpublished.

[46] As set out in Enabling a Natural Capital Approach (ENCA) guidance. Available from: www.gov.uk/guidance/enabling-a-natural-capital-approach-enca

that the monetised benefit of this target is underestimated in this IA. The benefits scoped into the assessment of this target include:

- **Regulating services**: Carbon sequestration and air quality regulation.
- **Cultural services**: Recreation and physical health.

For analytical purposes it is assumed that habitat creation will occur mostly on agricultural land, and a benefit unit value by hectarage for conversion from agricultural use to the specific habitat is estimated for the assessed benefits. These benefit unit values are applied to the total hectarage of habitat created over the assessment period to estimate the impact on benefits provision.

For restoration and maintenance action for habitats the impact on the benefit is modelled as a change in the profile of the benefits provided over the assessment period. A restored habitat is improved from a degraded state to good condition. Evidence on how ecosystem services change in response to a change in condition is limited. As a result, for the purposes of this analysis the degraded state is assumed to provide 50% of the benefit provided by a habitat in good condition (i.e., the full benefit unit value for the benefit from that habitat), and improve to good condition (i.e., providing 100% of the benefit unit value) over the course of 20 years from the beginning of the target period. The added value from the restoration activity is the additional benefit provision over the assessment period.

For approaches which maintain habitat in good condition, it is assumed that without maintenance, the habitat would degrade leading to a decline in the benefits provided. This avoided decline is assumed within the model as a gradual reduction in benefits to 0% of the benefit provided by a habitat in good condition over 60 years. The added value from the maintenance activity is the avoided loss in benefit over the assessment period.

While the modelling for habitat creation applies specific benefit unit values to the area of habitat created and provides a reasonable approximation of benefit provision, the approach to modelling restoration and maintenance has an added layer of assumption around the level of benefit provided by a degraded habitat. It is widely understood that the condition of a habitat is directly related to its ability to provide benefits. However, the function by which this occurs is not well understood for specific habitats and the range of benefits provided, which likely do not react in linear or even highly correlated ways.

Therefore, the assumptions applied for restoration and maintenance activities are not considered robust and the resulting estimates should be interpreted as demonstrating an indicative range of potential impact. Over the next few months, further work is ongoing to refine the assumptions and the analysis presented in this Consultation Impact Assessment, before the Final Stage IA.

Carbon sequestration

The carbon sequestration benefit has been estimated by multiplying the estimated tonnes of carbon dioxide equivalent (CO_2e) sequestered (through wetland and grassland

habitats[47]) by the non-traded central price per tonne of CO_2e in 2019 prices[48]. For habitat creation, the agriculture to habitat conversion sequestration rate is used for the first 10 years, the average carbon sequestration rate is used thereafter. The total amount of CO_2 equivalent sequestered is estimated by multiplying these per hectare rates with the total change in hectares of the respective habitat type due to the policy intervention.

Air regulation

This benefit relates to the human health benefits of the removal of particulate matter ($PM_{2.5}$) from the air by woodland[49]. The value of this is estimated through the reduced exposure of people to the relevant pollutants, and the resulting avoided healthcare cost.

To avoid double counting, the air regulation benefits associated with creating and restoring woodland outside of protected sites are not quantified in this IA but are considered within the woodland cover target. The air regulation benefits associated with improving the condition of woodland in protected sites (as an action included under the species targets) have been included in this IA.

The net change in annual air quality improvements is estimated for woodland in SSSIs. The $PM_{2.5}$ removal and value per hectare is multiplied by the area of woodland in SSSIs that is restored and maintained. The benefit of removal is estimated as the avoided health costs (treatment and productivity) plus welfare value (CEH and eftec, 2019)[50]. This factors in changes in the pollution and population levels from 2015 to 2030; values decline between 2015 and 2030 and are assumed constant post 2030.

Recreation

Recreation benefits are measured by the number of visits to accessible greenspaces, and the average welfare value and physical health benefits associated with these visits. The online Outdoor Recreation Valuation tool (ORVal)[51] is used to help quantify the recreation benefits of creating and restoring habitats under the biodiversity targets.

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[47] Carbon sequestration from woodland habitats have not been considered in this as they are included in the woodland cover target.

[48] The amount of CO_2e sequestered is valued following BEIS guidance. Valuation of greenhouse gas emissions: for policy appraisal and evaluation. BEIS. 2021. Available from: www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation

[49] As noted in ICF and eftec (2021), publication forthcoming, estimates are available for other habitats such as enclosed farmland and coastal margins, but the value of these is negligible compared to the value of woodland so only the air regulation of woodland habitats is included in this analysis.

[50] CEH and eftec. Pollution Removal by Vegetation tool. Available from: https://shiny-apps.ceh.ac.uk/pollutionremoval/

[51] Outdoor Recreation Valuation Tool (ORVal: Version 2.0). Developed by the Land, Environment, Economics and Policy Institute (LEEP) at The University of Exeter. Available from: www.leep.exeter.ac.uk/orval/

The possible future policy interventions to achieve the targets are not defined spatially, thus a broad estimate of the recreational benefits of the targets can be based on a generic location, the actual realised benefits will be highly dependent on where the specific actions occur. As a result, the value heatmap function in ORVal is applied. This feature returns the number of visits and welfare value for a grid of 25 possible site locations around the point specified by the user. This allows for average values to be taken if the general location of the areas is known. Six representative locations were chosen to show how the value of recreational benefits would be expected to change in different locations. The resulting number of sampled locations is 150 (25 possible site locations for each of the six representative locations). A representative value for the whole of England is derived as the average value of the six locations.

The sample of six case Local Authorities in England have been chosen to demonstrate how their locational characteristics would be expected to affect the value of benefit provision by the policy intervention. The six Local Authorities in England that were chosen to demonstrate how the value of recreational benefits may change based on different locations and their metrics on the location characteristics are presented in Table 7.

Table 7: Location specific characteristics of the six representative locations that can impact recreational value[52]

Local authority	Average income	IMD overall score	Population density	Green space per capita
Carlisle	Medium income	Medium deprivation	Low population density	High level of substitutes
Mole Valley	Medium income	Low deprivation	Medium population density	High level of substitutes
Nuneaton and Bedworth	Medium income	Medium deprivation	High population density	Low level of substitutes
Lichfield	High income	Low deprivation	Medium population density	Medium level of substitutes
Hartlepool	Low income	High deprivation	Medium population density	Medium level of substitutes
Bracknell forest	High income	Low deprivation	Medium population density	High level of substitutes

There is a non-linear relationship between the size of an open greenspace and the number of visits/value – adding additional hectares of open greenspace results in smaller increases in the number of visits. As the size of site created increases, the marginal value of the new visits declines. Therefore, the size of the new habitat created, restored or maintained needs to be accounted for to consider this diminishing marginal utility effect. Since the size of each site is not known, for the purposes of the benefits assessment, the average area of a SSSI (total SSSI in England divided by the total number of SSSI sites) was used as a proxy for the size of the habitats in the model. Rounded to the nearest 50 gives an assumed size of 250 hectares for each site.

[52] Based on .'Valuing Environmental Impacts: Practical Guidelines for the Use of Value Transfer in Policy and Project Appraisal. eftec. 2010 Available from: www.gov.uk/government/publications/valuing-environmental-impacts-guidelines-for-the-use-of-value-transfer

ORVal estimates both the number of total visits and new visits that would be made if the site was not there. The number of new visits is multiplied by the average value per total visit (i.e., total welfare value divided by the total number of visits). The annual values reported are the welfare values for the new visits. It is assumed that 50% of habitats are accessible to the public to account for the possibility that some habitats which are situated away from population centres or are not readily accessible to the public.

To estimate the recreational value from the changes in habitat areas, the number of new visits and the associated welfare value for sites of 250 hectares have been estimated. The per hectare value is derived by dividing the ORVal estimates by 250. For habitat creation, the new visits are assumed to reach full value 5 years after the habitat is created, whereafter the visits/value are assumed to remain constant.

Physical health

If people are active during their visits to created or restored habitats, recreational activities can provide physical health benefits. To estimate these physical health benefits, the proportion of the visits that are active, the health benefits of active recreation (in terms of improvements in Quality Adjusted Life years – QALYs[53]) and the economic value of health improvement (in terms of the avoided health cost due to improvements in QALYs) are taken into account.

It is assumed that 51.5% of recreation visits are 'active,' where an 'active visit' is defined as one undertaken by a person who meets recommended physical activity guidelines either fully, or partially, during weekly visits[54]. This assumption is applied to the increase in annual visits to greenspaces identified by ORVal, to estimate the number of annual active visits. For habitat creation, active visits linearly increase for the first 5 years, whereafter the visits remain constant.

The physical health benefit is measured as the improvement in QALYs. It is assumed the relationship between physical activity and QALYs is cumulative and linear[55]. The cost-effectiveness threshold of a QALY[56] which represents the additional cost that must be imposed on the health system to forgo one QALY of health through displacement is used as a proxy for health costs, reflecting the avoided health costs when QALY is improved by

[53] QALY is a health measurement used widely in health and health economics research. QALY of zero denotes death, and 1 denotes full health.

[54] White MP, Elliott LR, Taylor T, Wheeler BW, Spencer A, Bone A, Depledge MH, Fleming LE. Recreational physical activity in natural environments and implications for health: A population based cross-sectional study in England. Preventive Medicine. 2016.

[55] Beale S, Bending M, Trueman P. An economic analysis of environmental interventions that promote physical activity. University of York: York Health Economics Consortium. 2007.

[56] Claxton K, Martin S, Soares M, Rice N, Spackman E, Hinde S, Devlin N, Smith PC, Sculpher M. Methods for the estimation of the National Institute for Health and Care Excellence cost-effectiveness threshold. Health Technol Assess. 2015. Available from: https://pubmed.ncbi.nlm.nih.gov/25692211/

one unit. The avoided health cost is applied to the number of active visits. The monetary unit value is assumed to remain constant over time[57].

The present value estimate of benefits of the wider habitats target is £7,848m (where present values are calculated over a 78-year time period). As with the estimation of the costs of meeting the wider habitats target, only the benefits attributable to the additional habitat created or restored has been considered. The hectarage of woodland created has also been excluded given that the benefits of woodland creation are covered in the woodland cover target.

Table 8: Present value estimates of benefits of the wider habitats target, in the mix of creation and restoration scenario (present values estimates are calculated over a 78-year time period, 2022-2100)

Benefit	PV, £m
Carbon sequestration	2,899
Recreation	3,778
Physical health	1,171
Total	7,848

The present value estimate of the benefits of the protected sites actions to deliver the species targets is £35,607m (where present values are calculated over a 78-year time period). Some of the actions defined under the species targets will be carried out even in the absence of a legally binding target, and as such the benefits of a portion of the actions will be attributable to the baseline scenario and should not be included in the estimates in this section. It is estimated that 20% of the present value of the total costs of the actions necessary to achieve the species targets are not funded either by existing funding or streams that will be available prior to October 2022. It is therefore assumed that 20% of the present value total benefits are also attributable to introduction of legally binding species targets. As a result, the estimated present value benefit of the legally binding species targets is £7,275m (see table 9).

[57] This methodology follows the guidance set out in ENCA. Available from: www.gov.uk/guidance/enabling-a-natural-capital-approach-enca

Table 9: Estimated present value of the protected sites actions judged to be needed to meet the species targets (PV calculated over a 78 -year period, 2022-2100)

Benefit	PV, £m
Carbon sequestration	2,404
Air quality regulation	740
Recreation	3,131
Physical health	1,000
Total	7,275

Non-monetised benefits

The benefit assessment focusses on the benefits from protected sites actions and habitat creation and restoration outside of protected sites. The full benefits associated with the species targets have not been quantified, due a lack of evidence of the value of species in a UK context. As a result, no direct costs of species actions have been monetised, other than the benefits from the investment to improve protected site condition. Primary research which will attempt to quantify the value of England's species recovery ambitions in time to feed into the Final Stage IA for these targets has been commissioned.

A partial assessment of benefits was undertaken in the ICF and eftec (2021) report. The analysis considers a subset of the multiple benefits of Defra's biodiversity ambition. The selection of benefits is pragmatic, based on the available evidence and practical judgements concerning the robustness of the assumptions that support the estimation of the benefits. As such, several benefits are not explicitly captured due to insufficient evidence and data limitations including:

- Mental health.
- Volunteering.
- Education.
- Noise reduction.
- Water supply.
- Food security
- Pollination

Another limitation in the available evidence of the benefit of delivering the proposed biodiversity targets is due to the fact that there are no empirical studies examining the contribution of biodiversity to sustaining future benefits, through either “insurance values” or the resilience of natural assets to pressures. Generally, this is a key gap in the understanding of how biodiversity contributes to societal wellbeing. No routinely applied practical methodologies are available to robustly assess aspects of resilience value. Multiple aspects of biodiversity help ensure the resilience of ecosystem functions. From an economic perspective, measures for wildlife-rich habitats, protected areas, and species can all be thought of as sustaining or enhancing the ‘stock’ of biodiversity that helps confer high resilience in a system.

7. Direct costs and benefits to business calculations

The costs outlined above are the costs to society associated with delivering the scale of direct conservation actions likely to be required to meet the biodiversity targets. The targets are a duty on government and have been introduced to hold government to account. They do not create any direct requirements for the private sector.

However, meeting the targets will require efforts from a wide range of stakeholders and the government will need to consider the full range of policy levers – including incentives, regulation and creating the conditions for private sector investment – to deliver. These targets, together with the policies and incentives to implement them, will provide the regulatory certainty that could inspire businesses to invest in nature at scale. They are aimed at helping to stimulate investment in green technology and innovative practices by providing long-term certainty for business.

However, as outlined previously, the policy decisions that will be made over the next 20 years which support these targets cannot be known and analysed at this stage. Any future regulations that impact businesses will be subject to detailed Impact Assessments.

At this stage, the potential contribution of the private sector towards the actions identified as necessary in the cost assessment has been considered. At present, private sector contributions represents 3% of total funding for the species targets and 17% of total funding towards to wider habitats target.

This is expected to grow. The government has set an ambitious target to raise at least £500m in private finance for nature's recovery every year by 2027, rising to more than £1bn a year by 2030. Defra is taking action in four areas to mobilise new forms of funding for the protection and restoration of nature, and pivot businesses away from harmful activities:

- Developing ecosystem services markets across biodiversity, nature-based carbon and water/catchment services, ensuring there are predictable revenue streams for high-quality environmental outcomes;
- Accelerating natural capital investment, to unlock the upfront capital expenditure needed to implement nature recovery projects – including project pipeline development and public-private blended finance;
- Building skills and capabilities on the ground and in the finance sector to enable the step-change in investment; and,
- Nature-related financial risks in capital markets: shifting financial flows away from activities harmful to nature and towards nature-positive investment.

Additionally, Defra has been working with the Financing UK Nature Recovery Coalition, which is bringing together leader from the business, environment and land management sectors to better understand how we can scale up investment in nature.

If the private sector contributed 3% towards the species targets and 17% towards the wider habitats target, then the total cost to business of the proposed biodiversity targets would be £16.1m.

However, this is not a direct cost. Much of biodiversity funding from the private sector is expected to be voluntary (with businesses only likely to contribute investment towards the biodiversity targets if the private benefit exceeds their contribution) or as a result of existing/forthcoming regulatory measures (for example Biodiversity Net Gain).

Additionally, the direct costs to businesses of a legally binding wider habitats will be dependent on how the target is implemented. While regulatory levers could create additional costs to businesses, any future regulatory change will be subject to an Impact Assessment in which the costs to businesses will be explored.

8. Risks and assumptions

The analysis presented in this Consultation IA is still subject to refinement and will be finalised for inclusion in the Final Stage IA. The assumptions used and the approach taken will be kept under review and will be considered alongside any additional evidence that is gathered as part of the consultation process.

There are a number of assumptions underpinning the cost estimates for meeting the three long term (and the 2030 species abundance) proposed biodiversity targets. Most substantial are the assumptions made surrounding the actions that have been deemed necessary to achieve each target. As the targets are outcome based (except for the wider habitats target), a given target may be achieved by a different set or combination of actions to what has been assumed. As a result, the actual cost and resulting benefits of achieving the targets could differ from the estimated costs and benefits presented in this IA. The actions assumed in this IA have been informed by the relevant experts in the Defra group. Thus, it is believed that this provides a reasonable approximation of the costs and benefits given the available information and evidence.

Additionally, there can be no guarantee that the actions that have been defined and quantified under each target will result in the achievement of the respective target. While there is a good understanding of the type of actions that are required to meet the proposed targets, the evidence base quantitively linking actions to outcomes in biodiversity at national scale is limited, not least because the systems affecting outcomes for species and habitats are highly complex and dynamic. This results in difficulties in modelling the impact of the actions on each of the instruments that measure each target. If the monitoring and evaluation of progress reveals that additional actions or policy changes are required in future, the costs of meeting the targets may be higher.

To achieve the species abundance and extinction risk targets, the actions defined under the wider habitats target need to be undertaken in addition to the actions defined under the species targets. It is not possible for Defra's species ambitions to be achieved without widespread creation or restoration and of habitats. This approach was taken to limit double counting between the proposed biodiversity targets that this IA covers, as far as possible.

Moreover, as some of the target areas are heavily interlinked there is also a risk of double counting of costs and benefits between the biodiversity target areas and other target areas discussed in the other Environment Act IAs. As explained in the analysis, woodland creation under the proposed woodland cover target would contribute towards the wider habitats' biodiversity target. To minimise double counting, both the costs and benefits have been quantified in the woodland IA and cross referenced in this IA. It is likely that other overlaps remain. For example, there is a strong dependency between biodiversity and water quality and the costings in this IA include some pollution abatement measures identified as necessary to improve the condition of protected sites. Overlaps with other Environment Act targets will be explored further in the Final Stage IA.

In this IA there has been no consideration of the impact of other targets on the achievability of the biodiversity targets. Using the example above, if the woodland cover target is not met and there is insufficient woodland creation then this could impact the achievability of the wider habitats target. Additionally, it would mean that the costs and benefits of the delivering the wider habitats target have been underestimated in this IA. Similarly, tackling water and air pollution will also be important to deliver biodiversity targets.

There has also been no consideration of action sequencing across different target areas, although this could affect the timing and achievability of the biodiversity targets. For example, action that contributes to the woodland target may be necessary to help achieve the species related targets. As such, action would need to be taken sufficiently early to help achieve the species extinction target, the 2030 species abundance target and the long-term species abundance target.

It is expected that there is an underestimation of the benefits of achieving the proposed biodiversity targets. This is due both to the policy interventions not being spatially defined and a lack of available evidence, including on the direct monetary benefits of species interventions.

The analysis does not consider action on the landscape level. This may result in costs overestimated and benefits undercounted due to economies of scale.

Several assumptions have been made to monetise the costs of the legally binding species abundance targets. Most substantially, the unit costs of species friendly land management actions judged as necessary to achieve the targets have been informed by payments rates for the Sustainable Farming Incentive. It is possible that the average future unit costs to deliver species friendly land management at sufficient scale may be higher than assumed in the IA. Sensitivity analysis has been undertaken to explore this uncertainty.

As previously noted, widespread adoption of land management which supports the recovery of species (to increase the abundance of wider countryside species that are more likely to be reliant on farmed habitats) has been judged as necessary to achieve the species targets. To estimate the costs of such action for this IA, it has been assumed that that species friendly land management actions (such as those set out in proposed Sustainable Farming Incentive options and prescriptions) would be needed on 80% of hedgerow, arable land, improved grassland and unimproved/semi-improved grassland would need to be covered by to deliver improvements to species abundance. This assumption was informed by expert judgement from Natural England about the scale of action required in order to meet the species abundance targets. However, there is uncertainty around this assumption, thus sensitivity analysis has been undertaken. It is worth noting that an 80% coverage rate could be ambitious to achieve.

The government has decided not to proceed with a legally binding terrestrial protected sites target as part of the first suite of targets, but action to improve the condition of

protected sites is important for the achievement of the proposed species targets. Restoration works on protected sites takes longer for some habitats and sites than others, and different sites are at varying stages of recovery. In the absence of a plan which specifies restoration timetables for different sites, for the IA it was not possible for timelines of when favourable condition is likely to be achieved, or precisely the timing of actions needed to meet the targets to be modelled. As a result, in the analysis it has been assumed that remedial actions are needed across all SSSIs that are not currently in favourable condition. There is a risk that the costed actions will not deliver the improvement in condition of protected sites within the specified timescales, because of the uncertainties and lengthy timescales for responses in SSSI condition in response to remedial action. If so, this could have implications for the species abundance and extinction targets.

The analysis presented in this Impact Assessment provides only a partial assessment of the benefits of the biodiversity targets based on pragmatism and on what it was possible to include given data limitations, the available evidence and due to the policy ambitions not being spatially defined. Non-monetised benefits have been detailed in the benefits section of the IA. Additionally, as detailed previously the benefits of the species targets abundance and species extinction risk focused policy interventions have not been quantified due to limitations in the evidence base. This leads to the risk that the overall benefits of the terrestrial biodiversity targets are underestimated. To mitigate this risk and to fill a gap in the evidence base, primary research to capture the value of England's species recovery ambitions has been commissioned. This research should be complete in time to input into the final IA for these targets.

9. Impact on small and micro businesses

The Environment Act biodiversity targets are legally binding government targets that are not prescriptive in terms of delivery mechanisms. Small and micro businesses have a role to play in taking action to help achieve the targets, but any action they do take is expected to be largely on a voluntary basis, or because of existing regulatory measures (for example Biodiversity Net Gain). The introduction of the targets is not expected to have a disproportionate impact on small and micro businesses.

The impact of future policies for target delivery on small and micro businesses will be dependent on whether a given policy has a regulatory or incentive basis. Any regulatory policy which is brought forward will be subject to an IA in which the impacts of that particular policy on small and micro businesses will be appraised.

The impact of existing/forthcoming legislation such as Biodiversity Net Gain on small and micro businesses has already been assessed in a published Impact Assessment. The impact of future policies for target delivery on small and micro businesses will be dependent on whether a given policy has a regulatory or incentive basis. Any regulatory policy which is brought forward will be subject to an IA in which the impacts of that particular policy on small and micro businesses will be appraised.

10. Wider impacts

Setting long-term targets to protect and restore biodiversity will help to secure long-term economic security and prosperity, globally and in the UK. While there is inherent uncertainty around estimates of the long-term impact of biodiversity loss, at the global level the cost of inaction is much higher than the cost of action, as set out in the Dasgupta Review. Without government intervention individual efforts to halt and reverse the decline in species abundance are unlikely to succeed on a sufficient scale.

Targets will be set at the national level. Targeting actions in particular areas will not be mandated as part of these targets and so it is not possible to estimate the regional impacts of the biodiversity targets in this IA. The regional impacts of introducing the targets will depend on how the targets are implemented. Further detail on the impacts of individual future policies that contribute towards the targets will be assessed within their individual future Impact Assessments. However, it is expected that policies which support the delivery of these targets can create and support green jobs across the country – for example the £80m Green Recovery Challenge Fund is demonstrating the employment impact of investment in nature's recovery, creating and supporting up to 2,500 jobs across 159 projects. Research from Green Alliance/WPI Economics shows that those constituencies with the greatest employment challenges have considerable potential for new nature-based green jobs, demonstrating that progress against targets can contribute to the levelling up plan. Defra is planning to commission research to strengthen our evidence base of the skills needed to deliver the 25 Year Environment Plan, to help us ensure there is a pipeline of appropriately skilled people for these jobs.

Under Section 149 of the Equality Act (2010)[58], public authorities have a duty to consider how their policies and decisions affect individuals who are protected under the Equality Act (2010). As this Impact Assessment concerns only the decision on the overall level of the targets, rather than the policies needed to meet it, it is not possible to identify specific equality impacts. The government will consider equality impacts further as appropriate when additional policies and proposals are developed to meet the targets.

[58] Section 149 of the Equality Act (2010). Available from: www.legislation.gov.uk/ukpga/2010/15/section/149

11. A summary of the potential trade implications of measures

The potential trade implications of the Environment Act biodiversity targets are difficult to predict as they would be dependent upon future policies which may be brought forward to help contribute towards the achievement of the targets.

It is not expected that the terrestrial biodiversity targets will have a considerable effect on the UK internal market and international trade.

12. Monitoring and Evaluation

12.1. Monitoring progress towards biodiversity targets

The Environment Act creates a new statutory cycle of monitoring, planning and reporting. Long-term targets will be supported by interim targets, which will set a five-year trajectory towards meeting the long-term targets. This will allow for an ongoing assessment of whether the government is on track to meet its long-term target ambitions. Interim targets will be set out in the Environmental Improvement Plan, which will be reviewed at least every five years. The government will have to report annually on what it has done to implement the Environmental Improvement Plan and on whether the natural environment (or particular aspects of it) has improved. That report will also consider the progress that has been made towards meeting relevant targets. The new environmental watchdog, the Office for Environmental Protection, will also report annually on the progress that has been made in improving the natural environment in accordance with the Environmental Improvement Plan and on progress towards meeting targets.

For a target to be considered measurable, the government needs to either have or be in the process of developing a relevant indicator based on routinely collected data. The 25 Year Environment Plan Outcome Indicator Framework proposed a suite of indicators to track environmental change towards delivering an ecologically resilient network for thriving plants and wildlife, whilst making best use of our biodiversity data. The proposed targets build on the indicators in this framework, which represents our best available data.

Further information about the monitoring approach for each proposed target area is set out below.

Habitat monitoring

There is currently no consistent or comprehensive approach to monitoring to enable a robust assessment of the current extent and condition of semi-natural habitat outside of protected sites, even for those habitats classified as being of 'principal importance for biodiversity' under the Natural Environment and Rural Communities (NERC) Act 2006.

In time, the aim is to be able to monitor changes in the quality of these habitats. An indicator to directly monitor the quantity, quality and connectivity of habitats is currently being developed. However, this will require new data collection (as proposed through the Natural Capital and Ecosystem Assessment, which is currently being piloted[59]) and take several years to implement. An action-based habitats target rather than a condition target has been proposed at this time.

[59] https://www.gov.uk/government/speeches/george-eustice-speech-on-environmental-recovery-20-july-2020

Under the Biodiversity 2020 Strategy (Outcome 1A)[60] of 'Better wildlife habitats with 90% of priority habitats in favourable or recovering condition', an action-based assessment has in part been used as a proxy for habitat condition. The lack of a standard condition assessment process for measuring the precise condition of habitat outside SSSIs means that it has been necessary to rely on the SSSI reporting process, combined with an assessment of the extent of additional priority habitat under 'favourable management,' i.e., within an Agri-Environment Scheme agreement or similar arrangement. For this, a selection of 'beneficial management' options are selected matching the 'right option against the right feature' to ensure that reporting results are as ecologically sound as possible. For some habitats achieving good condition will take many years or decades, but AES management, based on 'right option-right feature,' can be considered as a good indicator that habitat improvement is taking place.

The indicator for this target will be based on action to create or restore diverse wildlife-rich habitats through a range of measures which include our Agri-environment schemes, Biodiversity Net Gain, the Nature for Climate Fund and as well action funded through other sources, including private capital e.g., actions by external partners including utilities companies, banks and mineral companies.

Species monitoring

Much of the data on species is collected through well-established volunteer-based recording schemes, many of which are run through partnerships between government bodies, NGOs, and research organisations (Box 1). In addition to the schemes supported by JNCC (Joint Nature Conservation Committee), national recording schemes exist for pollinators, moths, amphibians and reptiles.

Structured schemes where data is collected annually, following a strict pre-determined protocol, allow reliable conclusions to be derived from the data on the status of species and how their populations are changing in the long term. The methods used vary by scheme to allow data collection to be appropriate for the target taxonomic group, but include repeat sampling in randomised stratified surveys, complete censuses, and targeted surveys. Schemes may weight sampling to areas of interest e.g., the NPMS (National Plant Monitoring Scheme) sample locations are weighted towards sampling semi-natural habitats, but planned biases of this nature can be accounted for in analysis to understand national species trends.

Alongside these national structured schemes, there are also many UK schemes aimed at engaging the public with recording wildlife (e.g., the Big Garden Bird Watch, the Great

[60] Biodiversity 2020: A strategy for England's wildlife and ecosystem services. Defra. 2011. Available from: www.gov.uk/government/publications/biodiversity-2020-a-strategy-for-england-s-wildlife-and-ecosystem-services

British Wildflower Hunt). These more "entry level" schemes involve recording at more self-selected monitoring sites and may focus on recording a subset of more common species.

As well as contributing to recording schemes, each year amateur recorders submit many thousands of ad hoc species records to publicly available databases (e.g., to the NBN Atlas via the iRecord online recording system). These data are more numerous than records submitted from structured schemes and cover a greater breadth of taxonomic diversity. They can provide information on species distribution rather than abundance but may introduce greater bias in the data as sampling is more common for easily recognised species and in accessible locations. Both ad hoc recording and more "entry level" recording schemes are important for developing and maintaining taxonomic skills and encouraging engagement with biological recording. Additional unstructured species data will exist at the local level (including the Local Environmental Record Centres) and academic institutions.

Box 1. JNCC supported UK species recording schemes:

- Structured schemes
- Breeding Bird Survey (BBS)
- Wetland Bird Survey (WeBs)
- Goose and Swan Monitoring Programme (GSMP)
- Avian Demographics Scheme
- Seabird Monitoring Programme (SMP)
- National Bat Monitoring Programme (NBMP)
- UK Butterfly Monitoring Scheme (UKBMS)
- National Plant Monitoring Scheme (NPMS)
- Ad hoc recording schemes
- Rare Breeding Birds Panel (RBBP) collation of breeding bird records
- Support of recording schemes and societies through the Biological Records Centre (BRC)

The information gathered from these schemes is used to assess trends in distribution and/or abundance at UK, GB, or country scales, and to produce evidence both on current status and long and short-term changes. Many of the results feed into the UK biodiversity indicators, as well as being used for wider reporting purposes, including for international commitments. Data collected through these schemes also contributes to national official statistics on UK biodiversity. Some ad hoc data contribute to Red List assessments and distribution indicators for some species.

12.2. Evaluating progress towards biodiversity targets

The evaluation programme for the biodiversity targets, which is currently being scoped out, will be crucial for measuring, understanding, and driving progress. The evaluation will test the effectiveness and impact of different actions, work to understand causal relationships

related to the Theory of Change, analyse cost and benefits and progress towards biodiversity outcomes.

As part of ongoing scoping work, a wide range of factors including timing of key activities, data requirements and evaluation design are being considered. The evaluation design must consider the complexity of the biodiversity policy landscape. The system that supports the delivery of biodiversity targets comprises numerous inter-related policies and programmes, there is considerable uncertainty about the detailed specification of key programmes and there will be substantial change in the policy landscape during the life of the targets. In addition, the nature system that the targets programme aims to influence is itself complex and the impacts of interventions cannot be predicted with certainty.

To have a realistic prospect of achieving the government's ambition for nature recovery, Defra will need to adopt a dynamic, adaptive management approach that 'steers' the system towards the target outcomes.

13. Next Steps

This is a pre-consultation Impact Assessment which has been produced to support the consultation process. It sets out our current best assessment of the costs and benefits of the proposed biodiversity targets, and the key assumptions that have been made to derive these. A Final Stage IA will be produced later this year, to accompany the regulations to set the legally binding biodiversity targets.

As flagged throughout this Impact Assessment, there is currently a high degree of uncertainty around the costs and benefits of biodiversity targets. The Impact Assessment sets out the key limitations and includes sensitivity analysis of several key areas of uncertainty.

Over the next few months, further work is ongoing to refine our biodiversity targets Impact Assessment, before the Final Stage IA. In particular, further consideration will be given to the land use implications of the targets, assumptions around the scale and unit costs of the actions required to meet targets, the assumptions around the composition of creation and restoration of different types of habitat for the wider habitat target and overlap with other Environment Act targets and their respective IAs. Further research to improve our assessment of the benefits of the biodiversity targets, and to understand the potential impact of climate change on the delivery of the proposed targets is already underway.

Feedback on the pre-consultation IA and the external peer review of the underpinning cost benefit analysis project undertaken by ICF and eftec will also be important in helping to assess where the assumptions and analysis can be refined before the Final Stage Impact Assessment.

Given the inherent complexity of biodiversity and ecosystems, the long-term nature of the targets, and the limitations in the current evidence base, it is likely that a degree of uncertainty will remain the Final Stage IA. The analysis will be refined as far as possible over the next few months but in the longer term, substantial new research and analysis will be required to improve the existing evidence base around how and when biodiversity may change in the future as a result of policy interventions. Linked to this, an effective monitoring and evaluation programme will be essential for improving our understanding of biodiversity.