



**The Future of the Natural Environment after the EU Referendum inquiry
A response from the British Ecological Society to the Environmental Audit Committee**

9 September 2016

The British Ecological Society: *'A world inspired, informed and influenced by ecology'*
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Founded in 1913, we are the world's oldest ecological society, with over 5,000 members worldwide. As the voice of the UK's ecological community, we communicate the value of ecological knowledge to policymakers and promote evidence-informed solutions.

The UK is a world leader in ecological research. It is vital that in making changes to environmental policies following the decision to leave the EU, Government draws on this expertise and evidence base, and that the research community engages with decision-making.

Summary

- Leaving the European Union will have significant implications on UK biodiversity, presenting both risks and opportunities. These implications extend beyond the Common Agricultural Policy (CAP) including potential changes to a range of important policies and legislation.
- Agricultural intensification, supported by the CAP, has had an overall detrimental impact on the UK's natural environment, although the benefits of agri-environment schemes (AES) have improved in recent years.
- Developing our own agri-environment support system presents an opportunity to take a strategic approach to land use planning, integrating agriculture and ecosystem service delivery under a principle of "public money for public goods". The Government's 25-year plans for the natural environment, and for food and farming, should be strongly integrated.
- Design and implementation of AES must be informed by the significant body of scientific evidence as to their effectiveness, with an embedded programme of monitoring and evaluation.
- There is considerable and growing divergence in both AES and broader environmental policies between the nations of the UK. This must be managed to ensure that each nation's approach is consistent with our international obligations.
- Managed rewilding offers potential benefits to biodiversity and ecosystem service delivery, but the scientific evidence for its impact remains uncertain. If rewilding is considered as a policy option, it is important to develop a critical and rigorous scientific framework for its monitoring and evaluation, and comprehensive stakeholder engagement.

What are the implications for UK biodiversity of leaving the EU, in particular the Common Agricultural Policy?

1. The implications of leaving the EU for the UK's biodiversity and ecosystem services will depend on the terms of our future relationship with the EU, the extent to which EU Directives are retained, mechanisms for the enforcement of environmental legislation and the design of a new agri-environment support system. There is insufficient information to allow for a comprehensive assessment; however we refer to available evidence to provide suggestions in a number of key areas.
2. Many EU Environmental Directives and Regulations have emerged in response to international commitments such as to the Convention on Biological Diversity. UK Governments must ensure that environmental standards are upheld – or better, improved – to meet these international targets.
3. The Common Agricultural Policy (CAP) – the focus of this inquiry - has had a profound effect on the UK's natural environment. However, other policies and legislation with huge significance for the protection of biodiversity are at risk from the UK's decision to leave the EU.
4. In particular, we want to highlight the critical importance for our biodiversity and ecosystem services of the Birds Directive (2009/147 EC), Habitats Directive (92/43/EEC), Water Framework Directive (2000/60/EC), Marine Strategy Framework Directive (2008/56/EC), Maritime Spatial Planning Directive (2014/89/EU), Bathing Waters Directive (2006/7/EC), Invasive Alien Species Regulation (EU/1143/2014) and Environmental Impact Assessment Directive (2014/52/EU). The UK also benefits from a variety of EU funding programmes which support environmental delivery beyond the CAP (including LIFE+, Interred, Leader and ERDF).
5. While leaving the EU presents a number of risks to established environmental legislation, it also offers the opportunity to improve existing policies such as CAP, by adapting them to meet the environmental, societal and economic needs of the UK.
6. Agricultural intensification, supported for the last 40 years by the CAP, has had an overall detrimental impact on UK environment biodiversity, well documented in the scientific literature^{1,2,3,4,5,6}. The UK landscape has lost most of its semi-natural habitat through practices

¹ Krebs, J.R., Wilson, J.D., Bradbury, R.B. and Siriwardena, G.M. (1999) The second silent spring?, *Nature*, 400, pp611-612.

² Chamberlain, D. E., Fuller, R.J., Bunce, R.G.H, Duckworth, J.C. and Shrubbs, M. (2000) Changes in the abundance of farmland birds in relation to the timing of agricultural intensification in England and Wales, *Journal of Applied Ecology*, 37 (5), pp771-788.

³ Donald, P.F., Green, R.E., and Heath, M.F. (2000) Agricultural intensification and the collapse of Europe's farmland bird populations, *Proceedings of the Royal Society of London B*, 268, pp25-29.

⁴ Robinson, R.A. and Sutherland, W.J. (2002) Changes in arable farming and biodiversity in Great Britain, *Journal of Applied Ecology*, 49, pp157-176.

⁵ Berendse, F., Chamberlain, D., Kleijn, D. and Schekkerman, H. (2004) Declining biodiversity in agricultural landscapes and the effectiveness of agri-environment schemes, *Ambio*, 33, pp499-502.

⁶ Burns, F. et al (2013) *State of Nature report*. The State of Nature Partnership

such as the removal of hedgerows or drainage of species rich grasslands⁷. Habitat fragmentation, applications of increasing amounts of pesticides and fertilisers (although the latter has decreased in recent years), and the conversion of marginal land into production, have all been contributing factors to the decline in biodiversity^{1,4,8,9}.

7. While these impacts have been driven by agricultural subsidies incentivising production, the biodiversity benefits from agri-environment schemes (AES) have improved in recent CAP reforms^{8,10,11}. AES are now a major source of funding for the management of many of the UK's protected areas. Recent iterations of the CAP and AES have, however, not been ambitious enough to reverse the damage caused by earlier policies^{7,11}.
8. Even after the UK leaves the EU the CAP will still have implications for UK agriculture. The loss of the UK's contribution to CAP, and voice to ensure strong environmental standards may see a weakening of CAP agri-environment measures. This could have indirect consequences, for example a consequent weakening of our agri-environment measures in order to remain competitive with the rest of Europe¹².

To what extent do initiatives to support biodiversity in the UK depend on CAP-related payments?

Agricultural land and the wider environment

9. The 2014-2020 CAP maintains two pillars. Pillar I is the direct support component, comprising a system of multi-purpose payments, with seven components including a basic payment per hectare, a new 'greening' component (generally perceived as ineffective) and provisions on cross-compliance standards¹³. Rural development, including agri-environment schemes (AES), is the 'second pillar of the CAP'. Pillar II, under the European Agricultural Fund for Rural Development (EAFRD), is intended to develop a regionally and environmentally balanced agricultural system, resilient in the context of climate change, and competitive and innovative¹⁴.
10. Over half of the European landscape is under agricultural management; CAP related AES represent the highest conservation expenditure in the EU, supporting conservation in semi-

⁷ Pe'er, G., Dicks, L.V., Visconti, O., Arletazz, R., Báldi, A., Benton, T.G., Collins, S., Dieterich, M., Gregory, R.D., Hartig, F., Henle, K., Hobson, P.R., Kleijn, D., Neumann, R.K., Robijns, T., Schmidt, J., Shwartz, A., Sutherland, W.J., Turbe, A., Wuld, F. and Scott, A.V. (2014) EU agricultural reform fails on biodiversity, *Science*, 344 (6188), pp1090-1092.

⁸ Newton, I. (2004) The recent declines of farmland bird populations in Britain: an appraisal of causal factors and conservation actions, *Ibis*, 146 (4), pp579-600.

⁹ Reidsma, P., Tekelenburg, T., van den Berg, M., Alkemade, R., (2006) Impacts of land-use change on biodiversity: an assessment of agricultural biodiversity in the European union, *Agriculture, Ecosystems and Environment*, 114, pp86-102.

¹⁰ Vickery J.A., Bradbury R.B., Henderson I.G., Eaton M.A. and Grice P.V. (2004) The role of agri-environment schemes and farm management practices in reversing the decline of farmland birds in England, *Biological Conservation*, 119, pp19-39.

¹¹ Batáry, P., Dicks, L.V., Kleijn, D. and Sutherland, W.J. (2015) The role of agri-environment schemes in conservation and environmental management, *Conservation Biology*, 29(4), pp1006-1016.

¹² Martin Nesbit, Senior Fellow, Institute for European Environmental Policy at the People, Politics and the Planet: Any Questions event, held 21st July 2016. Available online <https://youtu.be/P4HEWYQPoDw>

¹³ European Parliament (2016) *Fact Sheets on the European Union: First pillar of the Common Agricultural Policy (CAP): II – Direct payments to farmer*. <http://bit.ly/2ctsQHx>

¹⁴ European Parliament (2016) *Fact Sheets on the European Union: Second pillar of the CAP: rural development policy*. <http://bit.ly/2ctpyBs>

natural protected areas as well as agricultural land¹⁵. In the UK, expenditure through AES accounted for the majority of the approximately £450m the government spent in 2014-15 on biodiversity conservation¹⁶. In England, expenditure on AES in the period 2007-2013 constituted €375 million per year, whereas Natural England's annual budget was only equivalent to around €250 million for the year 2013-2014¹¹.

11. In 2014, the total area of land in the UK in entry-level AES was just over 7.2 million hectares, whilst the area in higher-level or targeted AES was just over 3.1 million hectares¹⁶.
12. On balance, AES have been found to be beneficial to biodiversity, although the evidence for the effectiveness of individual schemes varies considerably¹⁷. There is little evidence that alternative approaches to involving farmers, such as unpaid voluntary management, are effective¹⁸ although that may be partially due to lack of monitoring¹⁹. Industry-led initiatives promoting wildlife-friendly farming generally operate by coordinating and shaping the content of AES agreements²⁰.

Protected Areas

13. Land management agreements under the CAP, with their associated capital grants, are a major source of funding for the management of protected areas (such as A/SSSIs, SACs and SPAs) and protected landscapes (National Parks and Areas of Outstanding Natural Beauty) across the UK. In England, "estimates suggest that, within protected landscapes alone, £95.5m of agri-environment funds per year are required to maintain landscape quality alongside other scheme outcomes"²¹. Protected landscape management requires a sustained level of finance in order to enable the scale of restorative environmental change required at a landscape scale²².

Additional funding beyond the CAP

14. Initiatives to support biodiversity in the UK are supported by other EU funding mechanisms beyond the CAP. LIFE²³ funding has enabled collaborative conservation projects at a scale

¹⁵ Hart, K. (2010) *Aspects of Applied Biology 100, Agri-environment schemes – what have they achieved and where do we go from here?* Association of Applied Biologists, Warwick.

¹⁶ Department for Environment, Food and Rural Affairs (2015) *UK Biodiversity Indicators 2015*. Department for Environment Food and Rural Affairs, London.

¹⁷ Dicks, L.V., Ashpole, J.E., Danhardt, J., James, K., Jönsson, A., Randall, N., Showler, D. A., Smith, R. K., Turpie, S., Williams, D. and Sutherland, W. J. (2016) *Pay farmers to cover the cost of conservation measures (as in agri-environment schemes)*, Conservation Evidence Synopsis <http://www.conservativevidence.com/actions/700>

¹⁸ Clothier, L. and Pike, T. (2013) *Campaign for the Farmed Environment: Summary of Evidence*. Defra Agricultural Change and Environment Observatory Report No.33 <http://bit.ly/2bHvGEE>

¹⁹ Glass, C.R., Boatman, N.D., Brown, C.B., Garthwaite, D., Thomas, M., Alexander, L.S. and Robinson, T.H. (2008) Evaluation of the performance of the Voluntary Initiative for pesticides in the United Kingdom, *International Advances in Pesticide Application*, pp163-166. Association of Applied Biologists

²⁰ Jones, N.E. and Boatman, N.D. (2013) Monitoring the implementation of voluntary environmental management measures under the Campaign for the Farmed Environment, *Aspects of Applied Biology*, 118, pp201-2017.

²¹ Department for Environment, Food and Rural Affairs (2016) *United Kingdom Rural Development Programme (Regional) – England* <http://bit.ly/2ciP1xk>

²² Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddown, R.W., Hilborne, S., Leafe, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.J., Tew, T.E., Varley, J., and Wynne, G.R. (2010) *Making Space for Nature: a review of England's wildlife sites and ecological network*. Report to Defra.

²³ LIFE is the EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU. Since 1992, LIFE has co-financed some 4306 projects. For the 2014-2020 funding period, LIFE will contribute approximately €3.4 billion to

otherwise unaffordable. 235 projects have received LIFE funding in the UK from 1992-2014²⁴. These projects represent a total investment of €967 million, of which €241.5 million has been contributed by the European Union.

15. There is also the risk of a decline in biodiversity and natural environment related research due to the loss of EU funding. For example, of the 235 LIFE funded projects, 8 were research projects with budgets ranging from nearly £1 million to over £7 million pounds²⁵. The risks to UK science from leaving the EU, including access to research funding, are well documented²⁶.

What risks and opportunities could developing our own agri-environment policy and funding present?

Opportunities

Developing an integrated approach to environment and agriculture

16. UK Governments have the opportunity to develop farming and environment policies that are: more likely to meet international environmental commitments; truly integrated; adapted to the UK's natural environments and environmental change; underpinned by a flexible and innovative A; able to and deliver better value to the public.
17. A new UK agricultural funding mechanism can shift the balance from income support towards payment for ecosystem services, for example biodiversity, carbon sequestration, flood management and water purification, based on the principle of "public money for public goods".
18. AES focused on ecosystem services should be aligned with existing national environmental commitments, such as the aims of the Natural Environment White Paper²⁷ and the recommendations of the Natural Capital Committee²⁸. In England, the proposed 25-year plans for the natural environment, and for food and farming should be integrated.
19. At a regional level, strategic land use planning, integrating agriculture and ecosystem service delivery at the catchment, or other appropriate scale, should be adopted. Regional and local differentiation, for example greater intensification, or land sparing for ecosystem service delivery, should be considered within this strategic framework, supported by stakeholder and public consultation.

the protection of the environment and climate. European Commission (2016) LIFE Programme – Country Factsheet: United Kingdom.

<http://ec.europa.eu/life/>

²⁴ <http://ec.europa.eu/environment/life/project/Projects/index.cfm> (Accessed 31.08.16)

²⁵ <http://ec.europa.eu/environment/life/project/Projects/index.cfm> (Accessed 31.08.16)

²⁶ Royal Society of Biology (2016) *Leaving the EU: implications and opportunities for science and research. A reply on behalf of the Royal Society of Biology to the Science and Technology Select Committee of the House of Commons* <http://bit.ly/2bZPkfk>

²⁷ Department for Environment, Food and Rural Affairs (2010) *The Natural Choice: securing the Value of Nature*. HM Government, London

²⁸ Natural Capital Committee (2015) *The State of Natural Capital: Protecting and Improving Natural Capital for Prosperity and Wellbeing*. Third report to the Economic Affairs Committee.

Adapting agri-environment measures to UK, national and local needs

20. Reducing administrative burdens for landowners and payment agencies in comparison to the CAP can help ensure that more money is spent directly on biodiversity conservation, and wider environmental enhancements. A proportionate approach to the control and verification of agri-environmental payments can be adopted, as well as a reduction in excessively burdensome conditions that currently constrain AES design and limit uptake²⁹.
21. Lessons learnt from the considerable amount of research^{30,31,32,33} into how best to deliver national agri-environment measures could be effectively put into practice: including providing more flexibility, both in the design of an agri-environment system that meets local and regional environmental needs and priorities, and being less prescriptive in how land management measures are carried out to meet scheme objectives.
22. Design and implementation of new agri-environment measures should draw upon the wealth of knowledge held by UK land managers, Government agencies, NGOs and scientists to develop schemes informed by the best available evidence. Improving the availability and accessibility of advisory services for land managers is essential to manage the transition to a new system.

Risks

Withdrawal of subsidies post 2020 leading to a loss of farm businesses, land abandonment and land use change

23. Whilst we welcome the Government's commitment to maintain current levels of agricultural support until 2020, competing spending priorities risk future reductions in agricultural, or specifically agri-environment support.
24. A major withdrawal of subsidies from the agricultural system could prompt significant changes to the agricultural landscape as land managers adapt to maintain viable farming businesses. This could include some agricultural areas intensifying activities with a loss of semi-natural habitats; leading to a homogenisation of habitats through the simplification of farming systems including fewer, larger farms with block cropping systems. There is also a risk of land abandonment, particularly in upland areas, should farms become financially uncompetitive,

²⁹ Matthews, K. (ed) (2012) *Developing agri-environmental measures for the next Scottish Rural Development Programme: A summary of relevant research findings from the James Hutton Institute*. Report for the Scottish Government.

<http://www.gov.scot/Resource/0039/00397513.pdf>

³⁰ Radley, G.P., Boatman, N., Green, M., Marshall, J., Musters, K., Peach, W., Peel, S., Siriwardena, G. and Smith, B., (2013) Lessons for the design of future agri-environment schemes. agri-environment schemes—what have they achieved and where do we go from here, pp.1-8.

³¹ Rollett, A., Haines-Young, R., Potschin, M. Kumar, P. (2008) Delivering environmental services through agri-environment programmes: a scoping study. The Land Use Policy Group. Available online <http://bit.ly/2bYJHzG> Accessed 02.09.16

³² Sutherland, W.J., Dicks, L.V., Ockendon, N., and Smith, R.K. (2015) *What Works in Conservation*. Cambridge, UK: Open Book Publishers. Available online <http://www.conservationevidence.com/pdf/What-Works-in-Conservation.pdf> Accessed 02.09.16

³³ Boatman, N., Ramwell, C., Parry, H., Jones, N., Bishop, J., Gaskell, P., Short, C., Mills, J., Dwyer, J. (2008) A review of environmental benefits supplied by agri-environment schemes. The Land Use Policy Group. Available online <http://www.snh.gov.uk/docs/A931063.pdf> Accessed 05.09.16

with an accelerated loss of smaller family farms and a consequent loss of local biodiversity, and knowledge relating to local environments³⁴.

Reduced agri-environment obligations and lack of enforcement

25. In the context of increased pressure on the competitiveness of UK agriculture, there is a risk that Government could choose to move towards income support payments for farmers, and away from agri-environment measures, for example through reduced cross-compliance requirements on income support payments, and a ‘dumbing-down’ of remaining AES to reduce costs of delivery without ensuring effectiveness.
26. Consequently, there could be a severe reduction in the amount of land management work carried out in the interest of restoring, protecting or enhancing biodiversity and ecosystem services. The Campaign for the Farmed Environment’s performance against its original targets showed the limitations of a purely voluntary approach to environmental land management¹⁸
27. Enforcement of environmental standards may become weaker due to the loss of sanctions currently provided by cross-compliance conditions attached to agri-environment support systems under the CAP. Continued reductions in the budgets of Government agencies may limit their capacity to advise on, support, implement and enforce new schemes.

Lack of co-ordination and increasing regional variation

28. Without a strategic approach to land use planning, guaranteed long term funding, and co-ordination by and between each of the UK governments, a “postcode lottery” of funding, and confusion and conflict at a local level, could arise.

How should future support for UK agriculture be structured in order to ensure there are incentives for environmentally-friendly land management? What are the positives/negatives of current schemes (e.g. Countryside Stewardship) that should be retained/avoided?

29. Financial support mechanisms based on delivery of ecosystem services, including biodiversity conservation can encourage land managers to cooperate to achieve the thresholds and patterns of change required to deliver desired outcomes that cannot be achieved at the farm scale.^{31,35}
30. AES need to be evidence-informed with continued monitoring, research and development to find ways of making schemes more effective. Monitoring and evaluation at agreement and scheme level, including collection of baseline data, as well as field studies of interventions are

³⁴ Gaskell, P. (2010) *Economic and environmental impacts of changes in support measures for the English uplands: an in-depth forward look from the farmer’s perspective*. Report to Defra by the Countryside and Community Research Institute and the Food and Environment Research Agency.

³⁵ Reed, M.S, Moxey, A., Prager, K., Hanley, N., Skates, J., Bonn, A., Evans, C.D., Glenk, K., and Thomson, K.. (2014) Improving the link between payments and the provision of ecosystem services in agri-environment schemes. *Ecosystem Services*, 9, pp44–53

required to continuously improve delivery³⁶. The level of investment in monitoring and evaluation (currently <1% of agri-environment scheme value) should be increased to ensure good value for money from any new scheme.

31. Adopting a purely prescriptive approach to environmental land management restricts the range of outcomes that can be successfully achieved, especially in a changing environment. Environmental land management schemes that are focused and targeted on specific environmental outcomes, and providing payments by results, are usually more effective than those with very general objectives. Better targeting of outcomes suitable to the farm / estate and the landscape it lies within is essential, but with the ability to retain adaptive and flexible land management.^{30,31,36}
32. Land managers need to be involved in the design and take up of agri-environment agreements to ensure buy-in to the intended environmental outcomes, with flexibility to determine how to meet objectives. Face-to-face after care, and practical and technical advice from familiar advisors trusted by farmers, is effective in supporting delivery of environmental outcomes³⁰.
33. Excessive uniformity of land management can have adverse environmental consequences since many species require heterogeneous habitats³⁰ or because the same management can have different effects in different contexts. This applies to uniformity engendered by active management or by land abandonment.
34. If a basic payment scheme is maintained, all agri-environment support should be linked to and used for delivering over and above statutory cross-compliance with enhanced environmental standards.³¹ Baselines should be achieved through effective and enforceable regulation, with the land manager culpable for any breaches. Penalties for unavoidable breaches should be removed to avoid discouraging land managers from seeking expert advice when not meeting agreed outcomes. A basic level environmental monitoring for cross-compliance purposes will need to be maintained alongside monitoring of more focused AES.
35. Higher levels of payment could be linked to more demanding and more bespoke and targeted management requirements or those providing greatest ecosystem services. These could focus on key habitats, landscapes and biodiversity concentrations.
36. Currently, AES agreements run for up to 10 years, with 5 year break clauses. A new AES should have the flexibility of making longer-term (and at times shorter-term) commitments, to better reflect the length of time environmental outcomes can take. This will both give confidence to farmers to make long-term investments, and provide better value to the public by securing long-term outcomes. In some instances, it may be cost-effective to secure outcomes through land purchase.

³⁶ Kleijn, D., Sutherland, W. (2003) How effective are European agri-environment schemes in conserving and promoting biodiversity? *Journal of Applied Ecology* 40, 947–969

37. In summary, we recommend a revised AES has the following features:
- i. A strong focus on delivering enhanced biodiversity and ecosystem services and paying by results, thereby securing public goods for public money.
 - ii. Incentives to encourage land-owner cooperation to deliver landscape scale changes.
 - iii. Greater flexibility: longer/ shorter term grants with funding levels set according to environmental benefit; a stronger focus on the desired outcomes, giving land managers more freedom to determine how they are achieved; the potential of land purchase.
 - iv. More scheme after-care to provide on-going support for farmers and land managers throughout their agreement.
 - v. Better monitoring and evaluation to ensure effective delivery and value for money.

How should future UK agri-environment support be administered, and what outcomes should it focus on?

38. It is important that future AES arrangements are simple and cost-effective to administer, thereby encouraging participation while maximising the funding available for environmental outcomes. Given the value of agri-environment support, and the need to ensure good use of public funds, government agency oversight and ultimate responsibility for the scheme may remain appropriate. However, a general payment-by results scheme could have flexible arrangements, such as National Parks or consortia of landowners and NGOs bidding to deliver all or some of the desired environmental outcomes for a region or local area.
39. Outcomes should be focussed on biodiversity and ecosystem services, including sustainable food production, water quality, pest regulation, soil fertility and measures to mitigate or adapt to climate change rather than focusing on prescribed management measures. The land managers can decide, with advisory support, how best to manage their land to meet the agreed outcomes, and be paid for those outcomes.

What are the prospects and challenges for future environmental stewardship schemes in the devolved administrations? How much divergence in policy between the nations of the United Kingdom is likely? How can divergence be managed?

40. There is considerable and growing divergence in both AES and broader environmental policies between the nations of the UK, such as the Environment (Wales) Act³⁷ and the Scottish Land Use Strategy³⁸, and this trend is likely to continue. This divergence reflects to some extent the different environmental conditions within the four nations, but also the variation in political structures and priorities, and co-ordination of the countryside agencies within them.

³⁷ *Environment (Wales) Act* (2016). Available at: <http://bit.ly/2bXWXoT>

³⁸ Scottish Government (2016) *Getting the best from our land: A Land Use Strategy for Scotland 2016-2021*. Scottish Government, Edinburgh.

41. Divergence must be managed to ensure that each nation's approach is consistent with the UK's international obligations (such as the Convention on Biological Diversity), and adapted to environmental change; a common reporting framework would facilitate this. Maintaining resource levels for agri-environment land management, both in terms of financial support and relevant technical personnel, in the face of diverse political priorities will be a key challenge.
42. The JNCC, and other UK-wide agencies such as Forest Research, will have an important role to play in facilitating communication and sharing of best practice between the nations of the UK, and in providing co-ordinated advice. Country agencies should collaborate where possible to develop a shared UK-wide vision for the natural environment, with local adaptability.

What are the future risks and opportunities to innovative land practices, such as managed rewilding? What role can rewilding play in conservation and restoration of habitats and wildlife? What evidence is there to support the incentivising of such schemes in any new land management policies?

43. Rewilding presents an optimistic, ambitious agenda for conservation that has captured the imagination of some ecologists, conservation practitioners and the public, with substantial support from popular champions^{39,40}
44. Rewilding is a contested term⁴¹ that has been applied to a range of visions and land management practices that share a common aim of reducing human intervention so natural environmental processes have greater scope to shape landscapes on a large scale over a longer period of time. This can include: reintroduction of keystone species, working at large scale and reducing management to allow ecological succession^{42,43}. Managed rewilding should not be equated to simple land abandonment.
45. While scientific research on rewilding is growing, there are currently few empirical studies. The suggested biodiversity and ecosystem service benefits of rewilding are largely unproven, with uncertainty over species translocations, the complexities of interactions between species and the likely character of rewilded ecosystems⁴⁴. Further research, including managed experiments is essential.
46. The potential benefits of rewilding include; enhanced delivery of ecosystem services, for example natural flood management and carbon sequestration, economic benefits from new

³⁹ Monbiot, G. (2013) *Feral*. Penguin, London.

⁴⁰ Jepson, P. (2016) A rewilding agenda for Europe: creating a network of experimental reserves, *Ecography*, 39 (2), pp117-124.

⁴¹ Jørgensen, D. (2014) Rethinking rewilding, *Geoforum*, 65, pp482-488

⁴² Lorimer, J., Sandom, C., Jepson, P., Doughty, C., Barua, M. and Kirby, K.J. (2015) Rewilding: Science, Practice and Politics, *Annual Review of Environment and Resources*, 40 (8), 1-24.

⁴³ Svenning, J.-C., Pedersen, P.B.M., Donlan, C.J., Ejrnaes, R., Faurby, S., Galetti, M., Hansen, D.M., Sandel, B., Sandom, C.J., Terborgh, J.W., and Vera, F.W.M. (2016), *Proceedings of the National Academy of Sciences*, 113 (4), pp898-906.

⁴⁴ Nogués-Bravo, D., Simberloff, D., Rahbek, C. and Sanders, N.J. (2016) Rewilding is the new Pandora's box in conservation, *Current Biology Magazine*, 26, R87-91

tourism and recreation opportunities, and greater cost-effectiveness of conservation measures⁴⁵.

47. Risks of rewilding include the reduction or loss of species associated with managed land, spread of invasive species currently kept in check by management, increased predator risk to livestock, threats to valued cultural landscapes produced through human intervention, and conservation conflicts.
48. If rewilding is to be considered as a policy option, it is important to develop a critical and rigorous scientific framework for its monitoring and evaluation, in line with previous recommendations⁴⁶.
49. Rewilding is not an appropriate conservation strategy everywhere and its potential in the UK may be limited as it requires a large scale approach only suited to less productive areas. Nevertheless rewilding could provide a more cost effective approach to large areas currently under intensive conservation management, and to the delivery of vital ecosystem services⁴⁹.
50. Managed rewilding will require human intervention, especially in the initial phases, with associated costs, including comprehensive and early stakeholder and public engagement, especially where species reintroductions are proposed.
51. Funding incentives could be provided under a future AES for initial start-up capital investments, ongoing maintenance costs, and compensation for reduced production or third party dis-benefits, for example livestock predation. It is important that funding is available over appropriate time frames, so that decisions are taken by landowners on sound long-term management criteria.

⁴⁵ Navarro, L.M. and Pereira, H.M. (2012) Rewilding abandoned landscapes in Europe, *Ecosystems*, 15, pp900-912.

⁴⁶ Hodder, K.H., Bullock, J.M., Buckland, P.C. and Kirby, K.J. (2005) *Large herbivores in the wildwood and modern naturalistic grazing systems*, English Nature Report Number 648. English Nature, Peterborough.