

Note to MA members on question numbering

- This draft follows the question numbering used in Defra's Call for Evidence.
- Where the MA responds to a question, the Defra question is reproduced first.
- Paragraph numbers such as 8.1 and 9.1 are the MA's own references within those answers.
- Questions outside the scope of the MA are not necessarily answered.

Call for Evidence Questions - About you

Question 1: Would you like your response to this call for evidence to be confidential in the event of an access to information request (see confidentiality and data protection above)?

No

Question 2: Provide your full name

Andrew Gilruth

Question 3: Provide your email address or, alternatively, your full postal address

agilruth@moorlandassociation.org

Question 4: In what capacity are you completing this call for evidence?

As a representative of an interest group or trade association

Question 5: If you are responding on behalf of an organisation, what is the name of that organisation?

(Required)

The Moorland Association

Question 6: Where are you, or the organisation you are representing, located?

England

Question 7: Would you like to answer questions regarding gamebird release and shooting, or would you like to skip to the questions regarding gamebird welfare during rearing and breeding?

Answer questions on gamebird release and shooting

Executive summary

The Moorland Association's response relates principally to red grouse shooting and the associated management of England's uplands. Red grouse are wild birds managed in situ and are not reared and released. The evidence concerning grouse shooting must therefore be distinguished from evidence concerning the breeding, rearing and release of pheasants, partridges and mallard.

The central conclusion of this submission is that the evidence does not support treating either grouse shooting or grouse-moor management as a single, uniformly positive or negative environmental pressure. The relevant evidence concerns a series of different activities—including habitat and vegetation management, lawful predator control, grazing, hydrology, wildfire-risk management, monitoring, access and the harvesting of grouse—which can produce different outcomes for different species, habitats and places.

There is credible evidence of adverse impacts associated with some practices and of illegal killing and other offences against birds of prey. Such evidence must be taken seriously and demonstrated harms should be addressed. There is also substantial experimental and observational evidence that some management associated with grouse moors can benefit upland habitats and species of conservation concern, particularly through maintaining suitable open habitat and improving the breeding success of some ground-nesting birds. An objective assessment must consider both.

The MA is not asking Defra to assume that existing management is necessarily optimal or that additional regulation could never be justified. We are asking Defra to establish what the evidence demonstrates before selecting a policy response, to distinguish scientific findings from subsequent policy judgements and to apply the same evidential standard to positive and negative claims.

Six principles run through this response.

1. **Assess individual practices and outcomes.** The presence of grouse shooting does not, by itself, establish that it caused either a positive or negative environmental outcome. Defra should identify the particular practice, plausible causal mechanism and measured outcome, distinguishing correlation from causation and proxies from ultimate environmental effects.
2. **Consider the realistic counterfactual.** The appropriate comparison is not between existing grouse-moor management and an assumed risk-free alternative. If management is restricted or removed, land use, investment, predator management, vegetation management, employment and conservation activity may also change. Defra should compare the likely environmental, economic and social outcomes of credible alternative management regimes.
3. **Recognise uncertainty and conflicting evidence.** Different studies sometimes produce different results because species, sites, methods and management contexts differ. Evidence gaps identified by government, regulators or researchers should not subsequently be treated as settled. Conflicting findings should be reported and evaluated rather than resolved through selective inclusion or weighting.
4. **Target demonstrated problems through proportionate measures.** Where a particular practice is shown to cause harm, policy should address that practice and the outcome concerned. Defra should consider the full range of available responses, including enforcement of existing law, improved practice, voluntary standards, adaptive management, earned recognition and additional regulation. A new statutory mechanism should be selected only where evidence demonstrates that it is necessary and likely to produce a better outcome than the available alternatives.
5. **Assess cumulative and unintended consequences.** Grouse-moor management supports employment, investment, specialist skills, recreation, community participation and

year-round habitat and wildlife management. These benefits do not override demonstrated environmental harm, but neither should they be excluded from the assessment. The effects of regulatory uncertainty may also arise before any decision has been taken on whether further intervention is required, where credible expectations of possible change affect recruitment, retention, infrastructure and long-term management investment. Experience in Scotland illustrates why any future policy appraisal should examine anticipatory, cumulative and displacement effects, rather than assessing impacts only from the point at which a particular intervention, if adopted, takes effect.

6. **Make the evidence-assessment process transparent and auditable.** The interpretation of a body of evidence can change materially according to which studies are included, excluded or emphasised and how uncertainty and conflicting findings are weighted. Defra should therefore publish its evidence-assessment methodology, inclusion and exclusion criteria, approach to study quality and declarations of interest, together with the evidence relied upon or an indexed evidence register. This should occur before policy options are selected, rather than being reconstructed after a preferred intervention has been developed.

If Defra subsequently proposes regulatory intervention, the baseline, intended environmental, economic and social outcomes, monitoring methodology and tests of success or failure should be published before a final decision is taken. Any review must be genuinely symmetrical: capable of recommending tighter requirements where evidence demonstrates continuing harm, but also capable of recommending stability, simplification or withdrawal where outcomes are being achieved, anticipated risks have not materialised or unintended consequences outweigh the benefits.

Otherwise, periodic review and continuing uncertainty risk creating a regulatory ratchet under which investment and management capacity decline even without an express prohibition. The result could be the practical loss of an activity—and of associated employment and beneficial land management—without an explicit assessment demonstrating that such an outcome is necessary, proportionate or environmentally preferable.

The MA therefore asks Defra to use this Call for Evidence to identify:

- which particular activities and practices produce which outcomes;
- the strength, limitations and geographical applicability of the evidence;
- where material uncertainty or conflicting evidence remains;
- the likely consequences of realistic alternative land-management scenarios;
- the environmental, economic and social effects of possible intervention; and
- which combination of existing regulation, improved standards, adaptive management, earned recognition or further intervention is most likely to deliver the outcomes sought.

The detailed answers which follow provide the supporting evidence and qualifications. Annex I identifies the principal sources relied upon, their evidential status, their relevance to the MA's response and their important limitations.

Section A: Call for Evidence Questions - Biodiversity

Question 8: What evidence is there of positive and/or negative impacts from:

- a. grouse shooting;
- b. pheasant/partridge release and shooting;
- c. mallard release and shooting on biodiversity.
- d. and related activities.

- 8.1 The Moorland Association's response to this question relates principally to (a) grouse shooting and (d) the associated land-management activities. We do not seek to provide specialist evidence on pheasant/partridge or mallard release and shooting, which are outside the principal focus of our membership.

Scope and evidential approach

- 8.2 The available evidence does not support treating grouse shooting or grouse-moor management as a uniformly positive or negative biodiversity pressure. Peer-reviewed experimental and observational research demonstrates that particular management practices associated with managed grouse moors, including lawful control of generalist predators and habitat and vegetation management, can produce positive outcomes for some upland breeding birds, including species of conservation concern. This includes experimental, observational and follow-up evidence concerning predator management and breeding waders, including Fletcher et al. (2010), Baines et al. (2023), Baines (2025) and Baines & Aebischer (2026). Other evidence identifies risks, limitations and species- or site-specific responses. The appropriate task for this Call for Evidence is therefore to identify which particular practices are associated with which outcomes, and with what degree of evidential confidence, rather than attributing a single biodiversity effect to "grouse shooting" as a whole.
- 8.3 The MA welcomes Defra's statement that this Call for Evidence does not make policy proposals or prejudice future regulation. The evidence-gathering exercise must therefore remain genuinely capable of supporting a range of conclusions, including that identified risks can be addressed through existing regulation, improved practice, voluntary standards or earned recognition and that no additional statutory intervention is justified by the evidence.
- 8.4 In assessing the evidence, Defra should distinguish correlation from causation, identify the particular activity or management practice associated with an outcome, recognise uncertainty and limitations, and consider credible alternative land-management scenarios. The relevant comparison is not between an existing activity and an assumed risk-free alternative, but between the likely environmental and social outcomes of realistic management options.
- 8.5 The MA also considers it important that the degree of confidence attached to an evidential conclusion reflects the state of the underlying evidence. Where Government, regulators or researchers have themselves identified material evidence gaps or commissioned further research to resolve uncertainty, those questions should not subsequently be treated as settled for the purposes of policy appraisal. Evidence of an intermediate outcome or proxy should similarly not be treated as evidence of the ultimate environmental outcome unless the causal relationship between them has been demonstrated. The same discipline should apply to predetermined tests of success: where a demonstration project has specified an outcome or viability threshold in advance, failure to meet that threshold should not subsequently be recharacterised as success because a lower level of activity might hypothetically have been possible.

- 8.6 This approach is consistent with the IUCN Species Survival Commission’s 2023 Guidelines on Human-Wildlife Conflict and Coexistence. Although those Guidelines are not specific to grouse shooting and do not provide evidence about its ecological effects, they set out relevant principles for decision-making in contested wildlife-management situations. They advise practitioners to “not rush into assumptions about causal links”, to understand ecological, land-use, social and governance context, to assess the risk of unintended consequences, to base planning and action on evidence and sound science, and to create a learning process in which interventions are measured, evaluated and adapted. They also emphasise that solutions should be context-specific rather than transferred automatically between situations and that longer-term decisions should consider landscape-scale ecological, economic and social effects (IUCN SSC, *Guidelines on Human-Wildlife Conflict and Coexistence*, 2023, Principles and Good Practice Checklist, pp. 11-14).
- 8.7 The relevance to the present Call for Evidence is methodological. Before attributing an outcome to gamebird shooting or selecting a policy response, Defra should identify the relevant ecological and human drivers, establish the evidential basis for the proposed causal relationship, consider the consequences and potential unintended effects of intervention, and assess whether conclusions drawn in one management context are transferable to another. This is consistent with the MA’s request that individual management practices, outcomes and realistic alternative land-management scenarios are assessed separately rather than treating “grouse shooting” as a single ecological pressure.
- 8.8 There is also more directly relevant precedent for this approach in the specific context of grouse-moor management. The Scottish Government’s independent Grouse Moor Management Review Group reported in 2019 that, despite an extensive review of the available evidence, “significant evidence gaps” remained and that much of the underlying science was contested. The Group drew on peer-reviewed research, public-sector and NGO evidence, stakeholder submissions, field visits and oral evidence, but nevertheless identified important uncertainty across issues including illegal killing of raptors and other bird-of-prey crime, socio-economic effects and aspects of moorland management.
- 8.9 That uncertainty did not lead the Group to conclude that no regulatory action was justified. Indeed, it recommended additional regulation in several areas and ultimately proposed that licensing of grouse shooting should follow if specified conservation improvements were not achieved within five years. However, the Group was evenly divided on the immediate introduction of licensing and expressly recognised that whether and when to license grouse shooting was ultimately a policy decision informed by, rather than determined solely by, the scientific evidence. The relevance to the present Call for Evidence is therefore methodological: where important evidence remains uncertain or contested, Defra should identify that uncertainty explicitly and distinguish the evidential findings from the subsequent policy judgement made on the basis of them.

Distinguishing shooting from associated management

- 8.10 It is important to distinguish between the act of grouse shooting and the wider system of land management associated with managed grouse moors. That distinction is particularly important because the Call for Evidence is intended to examine both positive and negative impacts. Red grouse are wild birds and are not reared and released. The relevant biodiversity question is therefore not simply the effect of harvesting grouse, but the effects of the individual management practices (including habitat and vegetation management, lawful predator management, grazing, monitoring and conservation investment) that may accompany that land use.

- 8.11 The presence of a species, incident or particular ecological condition on land managed for grouse shooting does not, by itself, demonstrate that grouse shooting or any particular associated management practice caused that outcome. Equally, the presence of grouse shooting should not, by itself, be treated as evidence of a positive biodiversity outcome. The same evidential standard should apply in both directions: the relevant practice, plausible causal mechanism and observed ecological outcome should, so far as the evidence allows, be identified separately.

Biodiversity evidence and individual management practices

- 8.12 There is evidence that some of these associated management practices can deliver positive biodiversity outcomes, particularly for upland breeding birds. For example, Natural England's own assessment of common snipe records evidence that grouse moor management, including predator control, may be beneficial to snipe, while also noting that the evidence is not uniform across studies and that an English study did not demonstrate the same benefit. This illustrates the importance of considering individual management practices, habitat and local circumstances rather than treating "grouse shooting" as a single ecological pressure.
- 8.13 This is not the only relevant evidence. Fletcher et al. (2010), Newey et al. (2016), Littlewood et al. (2019), Mustin et al. (2018), Baines et al. (2023) and Baines (2025) indicate that legal control of generalist predators can benefit some ground-nesting birds. Baines et al. (2023), for example, found curlew productivity around four times higher on the grouse moors than on the paired non-grouse moors examined, with breeding outcomes associated with lower indices of foxes and corvids. That was an observational paired-site study rather than an experimental manipulation and does not demonstrate that the same effect will occur in every landscape. It nevertheless provides further peer-reviewed evidence that predator abundance and management can be material to the breeding outcome of a species of conservation concern.
- 8.14 Longer-term evidence is also available from the area used for the earlier Upland Predation Experiment. Baines (2025) resurveyed four plots around Otterburn approximately ten years after the experimental predator-control programme had ceased. Carrion-crow abundance and the fox index had increased, while golden plover, snipe, red grouse and curlew had declined substantially and black grouse and grey partridge were no longer recorded on the study plots. Most measured habitat variables showed little corresponding change. The resurvey was observational rather than a repeat of the original controlled experiment, was confined to one study area and occurred against wider national changes in some of the species concerned. The paper also identifies released pheasants and partridges as one factor capable of supporting high generalist-predator densities and acknowledges continuing illegal killing of protected raptors. Those qualifications reinforce, rather than weaken, the need to distinguish different gamebird systems and individual causal mechanisms when assessing biodiversity outcomes (Baines, 2025).
- 8.15 More recent evidence from northern England also demonstrates why the overall management system should be examined rather than the act of shooting alone. Baines & Aebischer (2026) estimated approximately 1,764 breeding curlew pairs in Upper Teesdale and found that blanket bog managed by burning or cutting held more than twice the curlew density recorded on unmanaged blanket bog within the study. Estimated productivity was around one fledged chick per pair and repeat surveys approximately a decade apart indicated broadly stable numbers against a substantial national decline. This was an observational study in a landscape where habitat, farming, predator management and other aspects of grouse-moor management are interrelated, so the observed outcomes cannot be attributed to any one intervention. The study nevertheless provides current peer-reviewed evidence that a grouse-moor-dominated landscape can support high densities and breeding productivity of a species of significant conservation concern (Baines & Aebischer, 2026).

- 8.16 Vegetation management is a separate mechanism. A ten-year replicated field experiment on three northern English blanket bog grouse moors found that burning, cutting and non-management produced different effects on the elemental composition and nutritional quality of heather, with management effects generally diminishing as vegetation recovered over time (Heinemeyer et al., 2025a). The study measured plant chemistry rather than bird abundance or breeding success and should not therefore be treated as direct evidence of a biodiversity outcome. It is nevertheless relevant because it demonstrates experimentally that alternative vegetation-management treatments are not ecologically interchangeable and that their effects change through time. This supports assessment of the particular management intervention and outcome rather than assigning a single effect to “grouse-moor management.
- 8.17 Evidence from other European heathland systems provides additional, though not directly transferable, support for the ecological importance of habitat heterogeneity. Rainsford et al. (2026) found that mosaic cutting and prescribed burning in a Mediterranean Natura 2000 heathland regenerated open habitat and supported declining open-habitat birds relative to untreated reference areas. Brüggeshemke, Henning & Fartmann (2025) recorded higher densities of characteristic open-heathland birds on fire-managed German heathland than on a comparison area managed principally through grazing and cutting, while recognising other differences between the sites. Rittl et al. (2025), examining plants, invertebrates and soil biota in Norwegian coastal heathland, found that different managed successional phases supported distinct assemblages and that the resulting mosaic supported greater overall biodiversity than any single phase. These systems differ materially from English blanket bog in soils, climate and management history, so they should not be used to infer the effect of prescribed burning on English peatlands. Their relevance is narrower: they provide independent evidence for the ecological principle that different disturbance histories and vegetation structures can support different species and assemblages. Long-term work at Langholm similarly demonstrates that grazing pressure is a separate vegetation driver which must be considered when interpreting changes in heather cover (Ludwig et al., 2020).
- 8.18 The Moorland Association considers that the evidence should therefore assess separately, and where possible quantify:
- habitat creation, restoration and maintenance associated with grouse-moor management, including the effects of different vegetation structures and management histories (Heinemeyer et al., 2025a; Rainsford et al., 2026; Brüggeshemke, Henning & Fartmann, 2025; Rittl et al., 2025);
 - legal predator management and its effects on breeding success and population trajectories of ground-nesting birds (Fletcher et al., 2010; Mustin et al., 2018; Littlewood et al., 2019; Baines et al., 2023; Baines, 2025; Baines & Aebischer, 2026);
 - grazing and vegetation management, including their interaction and effects on habitat condition (Ludwig et al., 2020; Heinemeyer et al., 2025a);
 - wildfire prevention, preparedness and recovery;
 - monitoring and practitioner data collection;
 - the effects of management on designated-site features and wider species assemblages; and
 - any negative effects identified in the evidence, including where these can be attributed to particular management practices rather than to grouse shooting itself.
- 8.19 Equally, where good evidence demonstrates an adverse impact, it should be addressed. The objective should be to identify which individual practices produce positive outcomes, which produce negative outcomes, where effects vary between species or sites, and which practices can be improved.

Counterfactuals and alternative management scenarios

- 8.20 The Moorland Association therefore supports an evidence-led assessment of grouse shooting and associated management which considers the whole management system and its counterfactual: not simply what occurs on managed grouse moors, but what would be likely to happen to habitat management, predator management, monitoring and conservation investment if that management system were reduced or removed.
- 8.21 That need for counterfactual assessment is illustrated by the RSPB-commissioned Rayment analysis of future grouse-moor policy options. Although the report identified potential benefits from additional regulation and from alternative land-management approaches, it also recognised that changes to grouse shooting could alter land use, employment, predator management, vegetation management and species outcomes, and that those effects would differ geographically. Its assessment of a ban on driven grouse shooting envisaged cessation of heather management, predator control and red-grouse medication across substantial areas, while recognising that some conservation management might continue and that land might instead move towards peatland restoration, afforestation, rewilding or different grazing regimes (Rayment, 2022).
- 8.22 The RSPB's subsequent short-form briefing of the same study makes the counterfactual particularly clear. It records that driven and walked-up grouse shooting have materially different economic and management characteristics and states that a ban on driven shooting would have an "immediate and locally significant" negative effect on the rural economy, including loss of employment and cessation of associated management activities. The evidential point is not that these effects necessarily outweigh environmental benefits associated with alternative management, but that both sets of effects form part of the relevant comparison. Defra should therefore assess what habitat management, lawful predator management, monitoring, employment and conservation investment would actually continue under each realistic alternative land-management scenario, rather than assuming that existing benefits would either continue unchanged or disappear altogether (Rayment, 2022; RSPB, 2023).
- 8.23 Peer-reviewed modelling provides further evidence that the ecological counterfactual is material. Mason et al. (2025) modelled the effects of future management and climate change on red grouse, curlew and golden plover across Great Britain. Their modelling predicted reductions in all three species if grouse-moor management ceased, with larger projected declines when management change was combined with future climate change. At the median level of management intensity used in the study, predicted abundance was higher for all three species than on unmanaged moorland. However, climate and land cover explained substantially more variation than grouse-moor management for curlew and golden plover; the effects attributed to management were correlative; and the authors also identified potential benefits from cessation for controlled predators and raptors affected by illegal killing. The study therefore does not establish that continuation of current management is environmentally preferable overall. Its importance to this Call for Evidence is that a change in management has its own predicted ecological consequences and cannot be assessed against an assumed environmentally neutral alternative (Mason et al., 2025).
- 8.24 Recent Defra and Natural England-funded research on curlew recovery provides a complementary example. Macgregor et al. (2026) reviewed curlew-focused conservation interventions and modelled alternative population scenarios. The report found evidence that interventions can improve nest success, while also identifying low chick survival as an important constraint. Its high-productivity scenario drew on grouse-moor-adjacent farmland subject to intensive predator management; in the modelling, removal of that favourable management reduced the projected rate of population growth

substantially. The report also estimates that grouse moors support a significant proportion of the UK breeding curlew population. The authors emphasise that the intervention evidence is often based on relatively small datasets, that measures are commonly implemented together and that the scenarios are hypothetical, limiting attribution to any single intervention. Those limitations are important. The relevance here is that the likely continuation or loss of habitat and predator management needs to form part of the counterfactual rather than assuming that conservation outcomes would be unchanged under a different land-management system (Macgregor et al., 2026).

- 8.25 There is also a relevant example of this wider approach in the sector's own evidence base. In 2022, the Game & Wildlife Conservation Trust published *Sustaining ecosystems - English grouse moors*, which audited grouse-moor management against the environmental and socio-economic goals of Defra's 25 Year Environment Plan using a natural-capital framework. Rather than treating grouse-moor management as uniformly beneficial or harmful, the audit considered the upsides, downsides, challenges and opportunities associated with different aspects of management across biodiversity, water, climate, wildfire and other ecosystem services.
- 8.26 The report is a sector-produced evidence audit rather than an independent primary study, and the individual ecological propositions it contains should be assessed against their underlying sources. Its framework is nevertheless relevant to this Call for Evidence because it illustrates why policy should assess the combined effects and trade-offs of a land-management system, and compare those effects with credible alternative management scenarios, rather than examining individual interventions in isolation.
- 8.27 An earlier GWCT synthesis, *The Moorland Balance: The Science Behind Grouse Shooting and Moorland Management* (second edition, 2019), provides a further route into the underlying evidence base. It draws upon more than 160 peer-reviewed papers and brings together evidence concerning upland bird communities, vegetation management, peat formation, carbon, water, wildfire, rewetting, disease management, lawful predator control, raptor conflict, alternative land uses and rural economics.
- 8.28 The publication is relevant partly because it does not present every aspect of grouse-moor management as beneficial. It records evidence of illegal raptor killing on some grouse moors, acknowledges that inappropriate burning can cause harm, identifies the risk of unnecessary or inappropriate use of medicated grit, and repeatedly identifies uncertainty, conflicting findings and areas requiring further research.
- 8.29 The *Moorland Balance* is nevertheless a GWCT-authored sector synthesis rather than an independent systematic review. It should not therefore be treated as primary evidence for every proposition it contains, and individual claims should be assessed against the underlying studies and their limitations. The MA has included it as supporting evidence so that Defra has access to the breadth of relevant research and its extensive bibliography, and can examine the underlying science (including contrary findings and recognised evidence gaps) rather than relying upon a narrower selection of studies.

Transparency and the evidential audit trail

- 8.30 There is also a relevant policy context to the need for that transparency. Licensing of grouse shooting has previously been stated in Parliament to be Labour Party policy, although no commitment to license grouse shooting or gamebird shooting was included in the Labour Party's 2024 General Election manifesto. The MA therefore does not suggest that the present Government is bound by a manifesto commitment to introduce licensing. Equally, the existence of that earlier

policy position makes it particularly important that the present evidence-gathering exercise is demonstrably capable of reaching conclusions which are not predetermined by previous political positions.

- 8.31 Defra has expressly stated that this Call for Evidence “does not make policy proposals or prejudice future regulation” and that the evidence received will inform any potential next steps. The MA welcomes that assurance. If future policy proposals are subsequently brought forward, including any proposal for licensing, there should therefore be a clear and auditable evidential chain showing: the problem identified from the evidence; the strength and limitations of the evidence supporting that conclusion; the alternative explanations and counterfactuals considered; the range of regulatory and non-regulatory options assessed; and why the particular intervention proposed is expected to produce a better outcome than the available alternatives.
- 8.32 That evidential chain, including the methodology by which evidence has been assessed, should be published before policy options are selected, rather than reconstructed after a preferred intervention has been developed. Otherwise, neither stakeholders nor decision-makers can determine whether the evidence has genuinely identified the appropriate intervention or has instead been assessed through the lens of a pre-existing policy preference. Where the evidence remains uncertain or contested, that uncertainty must be reported as such. It would not provide a sound evidential basis for policy simply to resolve an acknowledged uncertainty in favour of a previously advocated intervention.
- 8.33 Defra should therefore publish, alongside its conclusions, the methodology used to assess the evidence; the criteria used for inclusion, exclusion and weighting; how study quality, relevance, uncertainty and conflicting evidence have been treated; and the role and declarations of interest of any external reviewers. Subject to legitimate confidentiality and data-protection requirements, Defra should also publish the evidence relied upon, or an indexed evidence register sufficient to show how the conclusions reached relate to the underlying material.
- 8.34 A related distinction is necessary between evidence and advocacy. The RSPB’s 2023 publication *Time for change: Commit to licensing*, for example, expressly describes itself as a “Driven Grouse Shooting Advocacy Report”. Its conclusion in favour of licensing is therefore evidence of an organisational policy position; it is not itself an independent scientific finding and should not be assigned evidential weight additional to that of the underlying evidence on which it relies. Defra should assess those underlying sources on their own merits, including their methods, findings, limitations, geographical applicability and degree of uncertainty, rather than treating the policy conclusion reached in an advocacy document as independent evidence in support of that same conclusion. A similar distinction was reflected in the Scottish Government’s Grouse Moor Management Review. Its Specialist Advisers, including Dr Adam Smith, formerly of the GWCT, were appointed for their individual knowledge and expertise, with the final report expressly stating that they should not be regarded as reflecting the views of their employers. RSPB Scotland participated in the Review as an external evidence provider, including through oral evidence from its Head of Research. Dr Smith has explained that the RSPB was not appointed within the advisory structure because it was regarded as a campaigning organisation. The significance is not that evidence supplied by a campaigning organisation should be excluded, but that organisational advocacy and independent expert assessment are different evidential roles and should be identified and weighted transparently. The same distinction should be applied consistently to advocacy material produced by shooting, conservation and other interested organisations.

Evidence selection in practice: the RSPB and GWCT Viewpoints

- 8.35 The importance of transparency in evidence synthesis is illustrated by two Viewpoint articles published in *Ibis*. Thompson et al. (2016), whose authors were RSPB scientists, reviewed the environmental impacts of high-output driven grouse shooting. The article acknowledged some environmental benefits, including the maintenance of heather moorland and benefits for some ground-nesting birds, but concluded that there was growing evidence of negative environmental impacts and societal costs.
- 8.36 In response, Sotherton, Baines and Aebischer (2017), whose authors were from the Game & Wildlife Conservation Trust, did not dispute that published evidence indicated damage from some aspects of grouse-moor management. They argued, however, that the overall case presented was incomplete and introduced additional published evidence, contrary findings, positive outcomes and areas of uncertainty which had been omitted or interpreted differently. This resulted in a materially different overall assessment without requiring every individual observation in the earlier article to be rejected.
- 8.37 Neither Viewpoint should be treated as a systematic review or as resolving the underlying debate. Their exchange nevertheless demonstrates that an overall synthesis can change materially according to which studies are included and how conflicting findings are weighted. Because the sources and reasoning were visible, those choices could be challenged. Defra should provide the same degree of transparency in its own evidence assessment.

Monitoring and symmetrical review

- 8.38 If Defra subsequently proposes a regulatory intervention, it should also publish the proposed monitoring and review framework before a final decision is taken. That framework should state: the baseline against which effects will be measured; the environmental, economic and social outcomes sought; the evidence required to demonstrate success or failure; how anticipatory, cumulative and displacement effects will be assessed; the timetable for evaluation; and the circumstances in which the intervention could be retained, tightened, simplified or withdrawn.
- 8.39 Review must be genuinely symmetrical. It should be capable of identifying a need for additional protection where evidence demonstrates continuing harm, but equally capable of recommending stability, simplification or relaxation where the intended outcomes are being achieved, anticipated risks have not materialised or unintended consequences outweigh the benefits. A framework whose practical direction of travel is limited to additional restriction would not provide an objective evaluation of outcomes.
- 8.40 This is also consistent with IUCN guidance, which emphasises that conservation actors (including researchers, NGOs and wildlife-management bodies) are themselves stakeholders in contested wildlife issues and should be transparent about their roles, priorities and potential positionality (IUCN SSC, 2023, Chapter 2).
- 8.41 This would allow any subsequent policy proposal to be traced clearly back to the evidence on which it is based, including where conclusions depend upon assumptions, proxies or unresolved uncertainty.
- 8.42 For transparency, the principal sources relied upon in this response, their evidential status and relevant limitations are summarised in Annex I.

Question 9: What evidence is there of impacts on species included in national species indicators or Red List species?

- 9.1 The Moorland Association's evidence relates principally to species associated with England's uplands and to the effects of land management undertaken on moors managed for wild red grouse.
- 9.2 A number of species occurring on managed moorland are themselves species of conservation concern. Birds of Conservation Concern 5 identifies, amongst others, curlew, lapwing, black grouse, woodcock, hen harrier, merlin and ring ouzel as Red-listed, while snipe and golden plover are Amber-listed. BoCC5 also concludes that there has been no overall improvement in the status of species associated with the uplands.
- 9.3 This makes it particularly important that policy assesses the effects of individual management practices on these species rather than assuming that the presence of grouse shooting is itself indicative of either a positive or negative biodiversity outcome.
- 9.4 There is a substantial body of evidence indicating that some management associated with grouse moors can benefit upland species of conservation concern, particularly through the maintenance of suitable open habitat and the lawful control of generalist predators.

Hen harrier: risks and breeding recovery

- 9.5 Hen harrier provides an important further example of why conservation outcomes and individual management practices need to be considered separately. The species remains Red-listed and evidence concerning illegal killing and other offences against hen harriers must be considered seriously. At the same time, Natural England's monitoring records a substantial increase in breeding activity during the period of the Hen Harrier Action Plan and brood-management trial. In 2021, Natural England recorded 31 breeding attempts in England, of which 24 were successful and fledged 84 chicks.
- 9.6 Natural England subsequently reported that nesting attempts increased from 12 in 2018 to 49 in 2022, with the increase occurring mainly on land managed wholly or partly for grouse shooting, while numbers on forestry land and moorland not managed for grouse shooting remained broadly steady. Its final 2026 evaluation of the brood-management trial records that the strongest increases occurred on grouse moors where brood management was available and concludes that the availability of brood management appears likely to have contributed to more hen harriers breeding successfully on some grouse moors.
- 9.7 Natural England-commissioned population modelling by the British Trust for Ornithology provides an important qualification to the interpretation of that recovery. Macgregor et al. (2025) examined 221 recorded breeding attempts during 2018-2024. The number of attempts increased from 14 in 2018 to 54 in 2023 before falling to 34 in 2024. The modelling concluded that the direct increase in productivity attributable to brood management and diversionary feeding was too small to explain most of the observed increase in breeding attempts: the estimated productivity gain was approximately 0.2 chicks per nest, equating in the peak year to roughly ten additional fledged chicks and, in the subsequent modelling, approximately one additional breeding pair. The increase in the English breeding population therefore required improvements in survival, settlement or both rather than being explicable simply by additional chicks produced through intervention (Macgregor et al., 2025).
- 9.8 Macgregor et al. considered reduced illegal killing or nest interference coincident with the availability of brood management as one plausible mechanism contributing to improved survival or settlement, while also recording that illegal killing and nest interference continued during the trial period. The

report therefore does not support attributing the recovery simply to the direct productivity effect of brood management, nor does it demonstrate that the underlying conflict has been resolved. It does, however, reinforce the importance of assessing the complete conservation response: breeding numbers increased substantially in England during the period in which the conflict-management measures operated, but the causal pathway is more complex than chick production alone. Defra should therefore consider both the continuing evidence of illegal killing and nest interference and the substantial improvement in breeding status, while distinguishing carefully between association, mechanism and demonstrated causation.

Predator management, breeding waders and Langholm

- 9.9 The GWCT Upland Predation Experiment provides experimental evidence of the effect of legal generalist-predator control. Lapwing, golden plover, curlew, red grouse and meadow pipit bred, on average, around three times more successfully when predator control was undertaken than when predators were not controlled. Breeding numbers subsequently increased during predator control and declined in its absence (Fletcher et al., 2010). Fletcher et al. was an experimental study rather than simply a comparison between different moors, and Natural England itself cites it in its 2026 assessment of common snipe.
- 9.10 The wider ecological mechanism is supported by Roos et al. (2018), which reviewed the evidence concerning predation as a limiting factor for UK bird populations and found good evidence that populations of some ground-nesting seabirds, waders and gamebirds can be limited by predation. This does not demonstrate that predator control is necessary or appropriate in every location, nor that habitat condition and other pressures are unimportant. It does, however, demonstrate that predation can operate as a population-level pressure rather than merely causing individual nest failures. Defra should therefore assess lawful predator management as a potentially material conservation intervention while considering its necessity, effectiveness and consequences in the particular ecological circumstances of each site.
- 9.11 More directly relevant recent UK evidence is provided by Baines et al. (2023). Across paired moorland study areas, curlew productivity was approximately four times higher on grouse moors subject to legal generalist-predator control than on paired non-grouse moors, with breeding outcomes associated with lower indices of foxes and corvids. The study was observational rather than an experimental manipulation, and the results should not be assumed to apply identically in every landscape. It nevertheless provides peer-reviewed field evidence linking differences in predator abundance and management with materially different breeding outcomes for a Red-listed species (Baines, Fletcher, Hesford et al., 2023).
- 9.12 Longer-term evidence from the area used for the earlier Upland Predation Experiment points in the same direction. Baines (2025) resurveyed four plots around Otterburn approximately ten years after the experimental predator-control programme had ceased. Carrion-crow abundance increased by 78% and the fox index by 127%, while golden plover declined by 81%, snipe by 76%, red grouse by around 71% and curlew by 24%; black grouse and grey partridge were no longer recorded on the study plots. Most measured habitat variables showed relatively little corresponding change. The later resurvey was observational rather than a continuation of the original experimental treatment, was confined to one study area and occurred against wider national declines in some of the species concerned, so it does not independently isolate predation as the sole cause. The paper also identifies released pheasants and partridges as one potential contributor to high generalist-predator abundance and acknowledges continuing illegal killing of raptors. Those qualifications are relevant because they reinforce the need to distinguish wild red-grouse management from released-gamebird systems and to assess different ecological mechanisms separately (Baines, 2025).

- 9.13 Current evidence from Upper Teesdale provides a further species-level example. Baines & Aebischer (2026) estimated approximately 1,764 breeding curlew pairs across the study landscape, equivalent to about 3% of the UK population. Blanket bog managed by burning or cutting held more than twice the curlew density recorded on unmanaged blanket bog within the study, and estimated productivity was approximately one fledged chick per pair. Repeat surveys around a decade apart indicated broadly stable numbers against a substantial national decline. The study was observational: habitat, farming, altitude, vegetation management and predator management were interrelated, and there was no unmanaged comparison landscape within the same experimental design. It therefore cannot identify one management intervention as the cause of the observed outcome. It nevertheless provides recent peer-reviewed evidence that a grouse-moor-dominated English landscape can support high densities and breeding productivity of a Red-listed species (Baines & Aebischer, 2026).
- 9.14 BTO fieldwork in the Yorkshire Dales provides useful corroboration at a smaller scale. Bowgen et al. (2025) GPS-tracked breeding curlew across a moorland-to-farmland gradient and recorded approximately 0.62 fledglings per pair per year. The report notes that some of the highest UK curlew densities occur on farmland adjoining moorland where landscape-scale predator control is undertaken. The sample was small and non-random, differences in breeding success between habitats were not statistically significant, and the authors caution against extrapolating beyond the Yorkshire Dales. It should therefore be treated as supporting rather than determinative evidence (Bowgen et al., 2025).
- 9.15 The wider intervention evidence has also been reviewed through the Defra and Natural England Species Recovery Programme. Macgregor et al. (2026) examined curlew-recovery projects across the UK and western Europe and modelled alternative population scenarios. The review found that conservation interventions could improve nest success but that chick survival frequently remained a limiting factor. Its high-productivity scenario drew on grouse-moor-adjacent farmland subject to intensive predator management, and removal of that favourable management materially reduced projected population growth. The report also notes an estimate that grouse moors support approximately 36% of the UK breeding curlew population. The questionnaire sample was too small for formal statistical analysis, interventions were commonly implemented together and the population scenarios were explicitly hypothetical. The report therefore does not isolate predator control as the sole explanation for curlew performance, but it provides current statutory-funded evidence that the management package and its potential loss are material considerations in curlew recovery (Macgregor et al., 2026).
- 9.16 Evidence from the Langholm Moor Demonstration Project also found that restoration of grouse-moor management was associated with increases in three breeding wader species: curlew increased by an average of 10% per year, golden plover by 16% and snipe by 21%. The authors concluded that restoration of predator control as part of grouse management could reverse declines in some breeding waders (Ludwig, Roos & Baines, 2019). The full paper is *Responses of breeding waders to restoration of grouse management on a moor in South-West Scotland*, published in the *Journal of Ornithology*.
- 9.17 Langholm is also useful because the responses were not uniform across species. During the Langholm Moor Demonstration Project, the partners reported that the project's heather-habitat targets had been met and that, by 2014, the number of nesting hen harriers exceeded the project target. Merlin breeding pairs increased from one in 2008 to six in 2014, while the number of lekking male black grouse increased from five to 18 over the same period. Subsequent peer-reviewed analysis of the restoration period reported increases in curlew, golden plover and snipe. At the same

time, red grouse did not recover sufficiently to support the commercially viable driven shooting which was one of the project's principal objectives.

- 9.18 This should not be interpreted as demonstrating that the management regime alone caused each of those changes. The Langholm project was a scientifically monitored demonstration project rather than a controlled experiment, and the response of individual species was influenced by different ecological factors. Its relevance is that the same managed landscape produced markedly different outcomes for different species. Langholm therefore illustrates why “grouse-moor management” should not be assigned a single biodiversity effect: Defra should examine the response of each species to the particular management mechanisms relevant to it.

Landscape-scale and national evidence

- 9.19 There is also evidence at a wider geographical scale. An analysis of grouse-management status across the north of England, mainland Scotland, Wales and south-west England found that range contraction of curlew, golden plover, lapwing and dunlin was smallest where grouse shooting had been retained and greatest where it had disappeared completely (Aebischer, Ewald & Tapper, 2010). The study was observational and does not demonstrate that grouse management itself caused the differences in range change, but it identifies a landscape-scale association which requires consideration alongside more local experimental and field evidence.
- 9.20 The same analysis also drew on Shepherd's 2005-07 breeding-bird survey of all 17 SSSIs forming the North Pennine Moors SPA, undertaken as an unpublished report to Natural England. Aebischer, Ewald & Tapper report that the survey recorded approximately 16,000 breeding pairs of five wader species and, after grouping SSSIs geographically, found that within most groups average wader density increased with the proportion of land managed for grouse. This was an observational secondary analysis of a Natural England-commissioned survey rather than an experimental comparison, and the underlying Shepherd report is unpublished. It should therefore not be interpreted as demonstrating that grouse management alone caused the differences observed. It does, however, provide a further landscape-scale comparison indicating that management context is associated with materially different breeding-wader outcomes.
- 9.21 A separate comparative study by Tharme et al. (2001), published in the Journal of Applied Ecology, examined the densities of breeding birds on heather-dominated moorland managed and not managed for red grouse shooting. Four of its five authors were affiliated with the RSPB at the time of publication, with the fifth affiliated with the Game Conservancy Trust. Densities of golden plover and lapwing were approximately five times higher, and densities of curlew and red grouse approximately twice as high, on the grouse moors studied. The study did not demonstrate a uniform benefit across the whole bird community, and its comparative design does not establish that grouse-moor management alone caused every difference observed. It nevertheless provides directly relevant evidence that management status was associated with materially different outcomes for several upland species now identified as being of conservation concern.
- 9.22 Black grouse provides a further example in which landscape structure and management need to be considered together. Warren et al. (2020) analysed 121 black-grouse leks in southern Scotland over the period 1989-2018. Leks which remained occupied were associated with more rough grassland, less conifer woodland and substantially larger contiguous areas of moorland; occupied moorland patches were approximately 26 times larger than unoccupied patches, while leks on moorland managed for driven red-grouse shooting held approximately twice as many males. Black grouse declined substantially across the study region, including on managed grouse moors, so the study does not demonstrate that grouse management prevented the wider decline. Its importance is that it

identifies habitat extent, fragmentation and management context as material factors for a Red-listed species and cautions against assuming that replacement land uses, including poorly located woodland expansion, are environmentally neutral (Warren et al., 2020).

- 9.23 Other research similarly identifies relationships between grouse-moor management and upland bird populations (Baines et al., 2014; Whitehead, Hesford & Baines, 2018; Newey et al., 2020). Curlew and golden-plover prevalence generally increased with the amount of controlled burning in the study examined by Newey et al., while merlin showed a more complex response, increasing up to intermediate levels of burning before declining at the highest levels. The work also has important limitations, including the absence of an unmanaged experimental control and the potential influence of predator management, habitat, surrounding land use and other correlated features of grouse-moor management. It therefore supports a species- and mechanism-specific interpretation rather than a simple proposition that greater management intensity produces uniformly better biodiversity outcomes.
- 9.24 Recent national-scale modelling provides a further test of these relationships. Mason et al. (2025) modelled red grouse, curlew and golden-plover abundance across 8,095 two-kilometre upland grid cells in Great Britain. At the median level of the management proxy used in the analysis, predicted abundance of all three species was higher than on unmanaged moorland; the authors modelled declines of approximately 33% for red grouse, 11% for curlew and 6% for golden plover if grouse-moor management ceased, with larger reductions when management change was combined with projected climate change. However, climate and land cover explained considerably more variation than grouse-moor management for curlew and golden plover, burning extent was used as a proxy because national predator-control data were unavailable, and the analysis was correlative. The authors also identify potential benefits of management cessation for controlled predators and raptors affected by illegal killing. This study therefore does not establish that current management should be retained unchanged; it does provide peer-reviewed national-scale evidence that management change and climate change can have different consequences for individual moorland species and that the counterfactual cannot be assumed to be biodiversity-neutral (Mason et al., 2025).
- 9.25 There is also relevant national-context evidence from the Office for National Statistics. Its 2022 natural-capital accounts for mountain, moorland and heath report that an unsmoothed UK moorland bird index increased by 12% between 1994 and 2019. Over the same broad habitat category, ONS reported that its moth-abundance index increased fourfold between 1991 and 2019. These aggregate trends are relevant because they provide evidence about the wider trajectory of selected components of moorland biodiversity rather than individual species alone.
- 9.26 They require careful interpretation. ONS describes the moorland bird index as an experimental index developed for natural-capital accounting and distinguishes it from the official bird indices. The figures relate to mountain, moorland and heath habitats at UK or Great Britain scale, not specifically to grouse moors, and the aggregate trends conceal substantial differences between individual species. They should therefore not be interpreted as evidence that grouse-moor management caused these changes. They do, however, reinforce the need for Defra to consider wider biodiversity evidence alongside individual species trends and to avoid inferring the condition of an upland ecosystem from a small number of selected species.

RSPB reserve monitoring: mixed species trajectories

- 9.27 A further illustration is provided by the RSPB Annual Reserve Avian Monitoring dataset made publicly available through the NBN Atlas. The MA has analysed matched reserve and species records

over the periods 2014-2018 and 2019-2023, excluding 2020 because of the disruption to monitoring during the Covid-19 pandemic (see Annex 6). Across the matched records examined, the recorded counts declined for a number of upland species of conservation interest, including curlew (-6.6%), golden plover (-14.9%), red grouse (-15.3%), black grouse (-38.4%), short-eared owl (-10.1%), dunlin (-4.4%), snipe (-10.3%) and ring ouzel (-26.0%). Other species increased over the same comparison, including merlin (+36.2%), skylark (+21.7%) and meadow pipit (+43.7%).

- 9.28 These figures require substantial caution. The dataset was not designed as a controlled comparison of alternative upland-management systems; survey coverage and reporting vary between reserves and years, the records do not by themselves establish equivalent survey effort, and the dataset does not identify the effects of particular management interventions, predator management, weather or other ecological pressures. Apparent changes at individual reserves may also reflect changes in reporting coverage. The MA therefore does not suggest that RSPB management caused the recorded increases or declines.
- 9.29 The relevance is instead methodological. The RSPB data show mixed trajectories among upland bird species within land managed principally for conservation purposes, just as the evidence from grouse-managed landscapes shows different responses among species and management interventions. This reinforces the need for Defra to avoid treating either grouse-moor management or an alternative conservation-management model as having a single biodiversity effect. The appropriate assessment is species-specific and should examine the relevant habitat, predator, hydrological, vegetation, climatic and other pressures, together with the management intervention and measured outcome.
- 9.30 A site-specific example is provided by the RSPB-commissioned assessment of future grouse-moor management options at Geltsdale in the North Pennines. The report records that changes in management increased overall biodiversity and that around 90 breeding bird species had been recorded. However, it also records declines in golden plover and curlew, while black grouse benefited from the more varied vegetation structure. In its detailed Geltsdale case study, the report states that changes to vegetation management had been agreed with Natural England and that changes in vegetation structure had adverse effects on some breeding waders, notably golden plover, while the local Natural England adviser had argued for further increases in scrub (Rayment, 2022).
- 9.31 Geltsdale should not be interpreted as demonstrating that conservation-led management caused every recorded decline, or that grouse-moor management would necessarily have produced a better overall biodiversity outcome. Its relevance is that different conservation objectives and management changes produced different responses among species. An increase in overall species richness or in a particular species such as black grouse does not, by itself, resolve what happened to golden plover, curlew or other species of conservation concern. Defra should therefore assess those outcomes separately, identifying the management mechanism, relevant pressures and appropriate counterfactual rather than treating any single species or aggregate biodiversity measure as a proxy for the whole upland bird assemblage.

Interpreting mixed evidence and conservation status

- 9.32 The evidence is therefore not uniform across every species or every management intervention. Natural England's 2026 assessment of common snipe illustrates this particularly well. It records the positive response of snipe following restoration of grouse management at Langholm (Ludwig, Roos & Baines, 2019), while noting that the northern England predator-control experiment did not demonstrate a corresponding benefit for snipe (Fletcher et al., 2010). Natural England also identifies drainage, agricultural improvement, habitat condition and changing climatic conditions as potentially important pressures on snipe populations.

- 9.33 The appropriate conclusion is therefore not that “grouse management” has a single positive or negative effect. Different species respond differently to particular interventions and local circumstances. The relevant evidence should distinguish, where possible, between the effects of habitat condition and vegetation structure; lawful predator management; hydrology and drainage; grazing and other agricultural land use; wildfire and vegetation-fuel management; disturbance; climate and weather; direct mortality; and the consequences of changes in grouse-moor management itself.
- 9.34 This distinction is also important when interpreting conservation status. Red-listing identifies conservation concern; it does not, by itself, establish the cause of a species’ decline. BoCC5 assessments take account of factors including historic and recent population decline, range change, population size, localisation, international importance and international threat status. Policy interventions should therefore be directed at pressures for which there is evidence rather than treating Red or Amber status as evidence that a particular land use is responsible.

The counterfactual for species conservation

- 9.35 The MA also considers that the relevant assessment must include the counterfactual. Where land is currently managed for grouse shooting, Defra should consider what would happen to habitat management, lawful predator management, monitoring and conservation investment if that management materially changed or ceased. Historic Scottish evidence illustrates why. Robertson, Park & Barton (2001) examined changes in heather moorland and reported an average loss of 24% of heather cover in areas which retained grouse-moor management, compared with 41% in areas where grouse management had ceased. The authors associated that difference principally with greater conversion of former heather moorland to grassland or forestry where grouse management was no longer maintained.
- 9.36 This is observational and historic Scottish evidence and does not establish that the same outcome would necessarily follow from policy change in England today. More recent evidence nevertheless demonstrates that alternative land uses can themselves influence species outcomes. Whitehead, Hesford & Baines (2018) reported declines in several upland bird species in south-west Scotland, including golden plover, lapwing and curlew, alongside substantial land-use change including afforestation, more intensive farming and reductions in grouse-moor management. Warren et al. (2020) similarly found that persistence of black grouse was associated with large contiguous areas of moorland and rough grassland and negatively associated with greater conifer cover around leks. These studies do not establish that woodland or alternative management is inherently harmful; they demonstrate that the location, extent and nature of replacement land uses matter to particular species.
- 9.37 The counterfactual has now also been examined explicitly through national modelling. Mason et al. (2025) predicted declines in red grouse, curlew and golden plover under a scenario in which grouse-moor management ceased, with climate change increasing the magnitude of projected declines. Those predictions are model-dependent and the estimated effects of management on curlew and golden plover were weaker than the effects of climate and land cover. Nevertheless, the analysis demonstrates that cessation of one management system should not be represented analytically as the removal of a pressure with all other ecological conditions held constant. Species distributions and abundance are likely to respond to the replacement vegetation, predator and land-use regime as well as to climate.
- 9.38 The Defra and Natural England-funded curlew review provides the same warning at population level. Macgregor et al. (2026) modelled curlew population trajectories under different intervention

scenarios and found that removing the high-productivity management scenario derived from land adjoining managed grouse moor substantially reduced projected population growth. The scenarios were explicitly hypothetical and the underlying intervention datasets were limited, so this is not a prediction of what would necessarily occur following regulatory change. It does, however, illustrate why Defra should identify which predator management, habitat management and monitoring would continue, cease or be replaced under each credible alternative scenario rather than assuming that existing conservation outcomes would persist automatically.

- 9.39 Taken together, this evidence does not identify a single inevitable consequence of changing grouse-moor management and does not establish that every current practice should continue. It does demonstrate that the alternative is itself an ecological scenario with potential effects on habitat structure, predator abundance, land use and species populations. Defra's assessment of Red List and indicator species should therefore be undertaken at species and management-practice level, recognising positive as well as negative evidence, distinguishing correlation from causation, and explicitly comparing credible alternative land-management scenarios.

Question 10: What evidence is there that practices aligned with recognised regulatory requirements, industry codes or guidance increase the likelihood of positive outcomes and reduce the risk of negative outcomes for biodiversity?

- 10.1 The Moorland Association considers that clear, evidence-based standards of practice can increase the likelihood of positive biodiversity outcomes and reduce environmental risks, particularly where those standards are outcome-focused, proportionate, practical to implement and supported by effective monitoring.
- 10.2 In the uplands, biodiversity outcomes rarely depend on a single intervention. They arise from the interaction between habitat condition, vegetation management, grazing, hydrology, lawful predator management, wildfire-risk management and disturbance. Codes and guidance can therefore be valuable where they translate available evidence into clear expectations for practitioners while retaining sufficient flexibility to respond to local ecological conditions.
- 10.3 The MA considers that the effectiveness of such approaches depends on several features:
- the standard or guidance should have a clear evidential basis and defined environmental objectives;
 - requirements should relate to measurable outcomes rather than simply prescribing process;
 - monitoring should be proportionate and capable of demonstrating whether the intended outcomes are actually being achieved;
 - standards should be capable of adapting as the evidence changes;
 - regulators should recognise and give appropriate weight to demonstrably high standards of management; and
 - different regulatory requirements should be coherent and should not create conflicting incentives or unnecessary duplication.

Existing standards and sector codes

- 10.4 There is already an established foundation of regulatory requirements, codes and guidance within the shooting and moorland-management sector. The 2023 evidence review *Sustainable Driven Grouse*

Shooting? records the development of the Principles of Sustainable Gamebird Management, which were designed to complement the Government's environmental objectives and draw together existing industry codes of practice, the UK legislative framework and international principles governing sustainable use of natural resources. The report records that in 2020 the Moorland Association joined BASC, the Countryside Alliance, National Gamekeepers' Organisation, British Game Assurance, Country Land and Business Association and Game Farmers' Association in supporting those Principles.

- 10.5 The Principles themselves build on existing requirements and guidance, including the Code of Good Shooting Practice, assurance standards and legislation governing wildlife, animal welfare and land management. The 2023 review concludes that, if fully implemented, such principles have the potential to deliver positive implications for biodiversity.
- 10.6 The MA does not suggest that the existence of a code or set of principles is, by itself, evidence that a biodiversity outcome has been achieved. The relevant test is whether the practice is implemented, monitored and associated with the intended environmental result. A code that exists only on paper is of limited value; equally, demonstrably effective practice should be recognised rather than disregarded simply because it is voluntary.

Regulatory and international principles

- 10.7 This approach is consistent with the independent Corry Review of Defra's regulatory landscape, which recommended greater focus on outcomes, scale and proportionality, more adaptive and process-light regulation, and a compliance model in which trusted partners demonstrating good performance can earn greater autonomy. Where recognised standards can be shown through monitoring to deliver the environmental outcomes sought, that performance should therefore be capable of recognition within the regulatory system rather than assuming that an additional statutory process will necessarily deliver a better result.
- 10.8 The same broad principle is reflected in IUCN guidance on policy instruments for managing conflicts over wildlife. The IUCN notes that effective policy commonly involves a combination of regulatory, economic and informational instruments, and cautions that arrangements accumulated over time can become incoherent or counterproductive. It recommends assessing existing instruments, their effectiveness and stakeholder experience before redesigning policy (IUCN SSC, *Guidelines on Human-Wildlife Conflict and Coexistence*, 2023, Chapter 24). The relevance here is not that regulation is unnecessary, but that the instrument selected should be proportionate to the problem, evidence and outcome sought.
- 10.9 More directly, the Council of Europe's *European Charter on Hunting and Biodiversity*, adopted under the Bern Convention, sets out principles for sustainable hunting based on reliable science, local knowledge, population and harvest monitoring, adaptive management and continuing review. It also calls for transparent regulatory processes involving hunters and other stakeholders and for rules capable of responding to differing biological, social and local conditions (Council of Europe, *European Charter on Hunting and Biodiversity*, 2007, Principles 1-3).
- 10.10 The Charter was formally welcomed by the IUCN World Conservation Congress in 2008 (IUCN Resolution 4.026). Taken together, the Corry Review, IUCN guidance and the European Charter provide support for an outcomes-based approach in which regulation, monitoring, practitioner responsibility and adaptive management can operate together, rather than assuming that one regulatory mechanism is necessarily appropriate in every circumstance.

Linking standards to measurable outcomes

- 10.11 The evidential question for Defra should therefore be whether adherence to a particular standard can be linked to a measurable environmental outcome. Evidence of adoption or compliance is relevant, but it is not the same as evidence of biodiversity benefit. The same caution is required where policy or advocacy material uses descriptors such as “intensive”, “less intensive” or “sustainable”. Those terms do not, by themselves, identify either a particular management practice or an environmental outcome. Where possible, Defra’s assessment should therefore identify the practice or level of intensity concerned, the environmental pressure it is intended to address, the level of implementation achieved and the resulting ecological response. Where a threshold between acceptable and unacceptable intensity is proposed, the evidential basis for that threshold and the measurable outcome it is intended to deliver should also be identified.
- 10.12 There is now peer-reviewed UK evidence demonstrating how that approach can work in practice. Baker et al. (2026) measured soil heating during eight prescribed vegetation burns undertaken by four trained teams operating according to the first UK vegetation-fire standards and within the legal burning season. Although surface temperatures reached approximately 1,000°C, temperatures measured at 2-3 cm soil depth remained very low: the mean maximum was below 17°C, only four of 189 thermocouples exceeded 70°C, and those exceedances lasted for a mean of approximately 29 seconds. Fire-severity assessments recorded no loss of below-ground organic matter, and measured temperatures were substantially below those associated with pyrolysis of peat. The study therefore provides directly measured evidence that prescribed burns undertaken by trained teams in accordance with defined standards and under suitable conditions can limit one important environmental risk: damaging heating of the underlying organic soil (Baker et al., 2026).
- 10.13 The limitations are equally important. Baker et al. examined eight burns carried out under relatively mild conditions by experienced teams; measurements related to individual burn events and principally to soil temperatures at 2-3 cm depth. The study does not establish the long-term carbon balance of repeated burning, the effect of different burning rotations, vegetation recovery or wider biodiversity outcomes, and it should not be interpreted as demonstrating that every prescribed burn conducted in every circumstance is environmentally benign. Its particular significance to this question is narrower but important: it links defined operational standards and trained practice to a directly measurable environmental outcome rather than treating compliance with a code as an outcome in itself.
- 10.14 This distinction is illustrated by the Scottish red-grouse licensing regime. The regime requires licence holders to comply with a statutory Code of Practice and includes provisions for modifying, suspending or revoking licences in connection with relevant offending or non-compliance. Although the Code requires grouse-bag returns, it does not define “intensive” or “less intensive” shooting or prescribe a maximum grouse bag or number of shoot days. The existence of the Scottish regime therefore provides no evidential threshold between “acceptable” and “unacceptable” shooting “intensity” and should not be treated as demonstrating that licensing is the appropriate response to a concern expressed in those undefined terms (NatureScot, Code of Practice for Grouse Moor Management, 2024).
- 10.15 International evidence provides supporting context for the importance of operational standards, while requiring caution in transfer to English uplands. Szczygieł et al. (2025) describe a controlled-burning methodology developed for heathland conservation in Poland which specifies planning, weather conditions, staffing, training and fire-control procedures. Monitoring associated with the programme recorded substantial vegetative regeneration of heather in the first year and development of a habitat mosaic over subsequent years without a reported reduction in plant, fungal

or invertebrate diversity. The work concerns lowland dry heath on mineral soils rather than blanket peat and is principally a methodological paper rather than a controlled ecological experiment, so it should not be treated as evidence of equivalent outcomes on English peatlands. Its relevance is that recognised standards for potentially high-risk management interventions can combine defined operational limits, trained practitioners and subsequent monitoring rather than relying on a simple prohibition or permission.

- 10.16 Defra should therefore assess recognised standards against measurable outcomes rather than treating either the existence of a standard or compliance with it as proof of success. Where research demonstrates that specified training, operating conditions and procedures reduce a measurable environmental risk, that evidence should inform the standard; where monitoring shows that the intended outcome is not being achieved, the standard should be capable of adaptation. The relevant question is not whether a practice is labelled “regulated”, “voluntary” or “sustainable”, but whether the required practice can be shown, with an appropriate degree of confidence, to improve the outcome or reduce the identified risk.
- 10.17 Operational evidence can also help test whether compliance with a prescribed management process produces the intended ecological outcome. A Peak District Moorland Group case-study report records Sphagnum inoculation undertaken following approved vegetation cutting on deep-peat SSSI sites. At Woodhead and Snailsden it reports that 360,000 Sphagnum plugs were planted, with estimated survival of up to 30% in wetter areas but below 1% in drier areas; in a survey covering more than 1,500m² of inoculated ground, only 71 plugs were located. At a second site, 1,000 plugs planted across ten permitted cuts were reported to have experienced a 100% failure rate. These are practitioner-reported, site-specific case studies rather than an independently controlled experiment, and they do not establish that Sphagnum inoculation is ineffective generally. Their relevance is narrower: they illustrate why a requirement or standard should be assessed by whether it delivers the intended outcome under the conditions in which it is applied, and why monitoring should allow prescriptions to be adapted where that outcome is not being achieved (*The Blanket Approach is Failing*).
- 10.18 In that context, the outcome of this Call for Evidence should remain genuinely open: further statutory regulation should be considered only where the evidence demonstrates a problem requiring it and where it can reasonably be expected to deliver a better outcome than existing regulation, improved standards, adaptive management or earned recognition. Where those tests are not met, the evidential conclusion should be that an additional statutory mechanism has not been justified.

Question 11: What evidence exists on the factors that influence whether practices aligned with recognised regulatory requirements, industry codes or guidance are adopted and maintained?

- 11.1 The Moorland Association considers that adoption and continued use of recognised standards is influenced not simply by whether requirements are mandatory or voluntary, but by whether practitioners regard them as credible, practical, proportionate and capable of delivering the environmental outcome sought.

Evidence of voluntary adoption

- 11.2 There is evidence that voluntary approaches can achieve high levels of uptake within the shooting community. For example, GWCT reported in 2026 that 89% of respondents to its membership survey did not shoot woodcock before the recommended date and 92% did not shoot snipe before

30 September. The same survey found evidence of changes in bag size and of habitat-management activity associated with quarry species. GWCT concluded that there was evidence of self-regulation and argued for greater use of adaptive management supported by improved recording.

Factors influencing adoption and continued compliance

11.3 The MA's experience of upland land management suggests that several factors are particularly important in determining whether standards are adopted and maintained:

- **Clear purpose and evidence:** practitioners need to understand what environmental problem a requirement is intended to address and the evidence linking the required action to the desired outcome.
- **Practicality:** standards need to be capable of implementation under real land-management conditions and sufficiently flexible to accommodate differences between sites.
- **Proportionality:** requirements which impose significant administrative or operational burdens without a commensurate environmental benefit risk reducing engagement rather than improving outcomes.
- **Consistency and regulatory certainty:** land managers are better able to make long-term investments in habitat and conservation management where the regulatory framework is stable, coherent and predictable.
- **Co-design and practitioner involvement:** those responsible for delivering management on the ground can contribute practical knowledge to the design of standards and help identify unintended consequences before requirements are implemented.
- **Monitoring and feedback:** practitioners are more likely to maintain standards where monitoring demonstrates whether actions are working and where requirements can be adapted in response to evidence.
- **Recognition of good performance:** there should be a meaningful benefit to demonstrating consistently high standards. An approach based on earned recognition can provide an incentive for continued improvement while allowing regulatory attention to be focused where risks are greatest.

11.4 Current England-specific research provides support for several of these factors. Noyes et al. (2026), in a Defra Farming in Protected Landscapes-funded assessment of agri-environment provision for curlew in the Yorkshire Dales, reviewed current Sustainable Farming Incentive and Countryside Stewardship Higher Tier options alongside interviews with participating farmers. The authors found that existing options did not provide for lethal predator control and could not fund some of the landscape-scale coordination required, including facilitators and multi-holding agreements. They also noted that the intensive and experienced predator management undertaken by grouse-moor gamekeepers had rarely been replicated through agri-environment schemes. All farmers interviewed supported inclusion of lethal predator control within future environmental schemes.

11.5 The study has important limitations: only 18 farmers across 11 farms were interviewed, the participants were already involved in a wader-conservation project and their views should not be assumed to represent farmers generally. Nor does the study demonstrate that any particular scheme design produces a specified biodiversity outcome. Its relevance to this question is narrower: it

provides direct contemporary evidence that the availability of appropriate management options, adequate funding and mechanisms for landscape-scale coordination can influence whether practitioners consider conservation measures practical and deliverable (Noyes et al., 2026).

- 11.6 Peer-reviewed international research provides complementary evidence that regulatory design and practical costs can affect uptake even where the underlying management intervention has substantial expected benefits. Muyima, Kleynhans & de Lange (2025) examined prescribed burning among 13 commercial farmers in South Africa's Langeberg Mountains. Their cost-benefit analysis estimated benefits substantially exceeding the direct costs of prescribed burning, principally through avoided wildfire losses and suppression costs, yet 69% of the farmers surveyed did not undertake prescribed burning. The authors identified legal liability if a burn escaped, permit delays and labour costs among the barriers to uptake and recommended changes intended to reduce those constraints.
- 11.7 The South African legal system, vegetation and wildfire context differ materially from the English uplands, and the study is based on a very small sample and self-reported financial information. Its numerical findings should therefore not be transferred to England. Its relevance is instead behavioural and regulatory: even where practitioners perceive an intervention to have benefits, liability, administrative delay, transaction costs and insufficient practical support can affect whether that intervention is adopted and maintained (Muyima, Kleynhans & de Lange, 2025).

Independent support for these factors

- 11.8 There is independent support for several of these principles from the Scottish Government's Grouse Moor Management Review Group. Having examined a range of regulatory approaches specifically in relation to grouse-moor management, the Group concluded that regulation should follow Better Regulation principles and be transparent, accountable, consistent, proportionate, accessible, effective and targeted only where needed. It also recognised that regulation need not rely upon a single mechanism: education and training, Codes of Practice, accreditation, financial incentives and statutory controls can operate in different combinations according to the risk and the outcome being sought (Grouse Moor Management Review Group, 2019).
- 11.9 Of particular relevance to this question, the Group recommended that land managers undertake training in relevant management activities, with refresher training where required, to support compliance with Codes of Practice. It also recommended that an accreditation scheme for grouse-moor management should be developed following widespread consultation with the grouse-shooting sector. In its consideration of regulatory options, the Group described accreditation as an approach which can reward good behaviour rather than relying solely upon sanctions for poor behaviour.
- 11.10 The MA considers that this provides useful independent precedent for an earned-recognition approach. Accreditation is not, by itself, evidence that an environmental outcome has been achieved, and any such scheme would need credible standards, monitoring and appropriate governance. But where managers can demonstrate the training, systems and environmental performance required by an agreed standard, recognition of that performance can provide an incentive for continued compliance while allowing regulatory attention to be concentrated where evidence indicates greater risk.

Adaptive management and auditable delivery

- 11.11 There is also practical support for an adaptive approach. GWCT's Sustaining ecosystems - English grouse moors recommended site-specific environmental management plans, routine monitoring of management outcomes and adjustment of practice in response to the results. Its relevance here is not evidence that such arrangements have already delivered particular environmental outcomes, but

that they provide a practical model through which standards can be made auditable and adaptive (Game & Wildlife Conservation Trust, Sustaining ecosystems - English grouse moors, 2022).

- 11.12 Defra's 2026 Towards a flourishing uplands review supports the same broad approach from outside the shooting sector. It cautions that technical solutions can fail where the social and practical conditions for implementation are not understood, describes existing approaches as too often "top down and technical", and calls for local voices, trusted relationships and longer-term goals. The independent Dartmoor Review provides a practical example through Dartmoor Farming Futures, where farmers participated in designing, delivering and monitoring environmental outcomes, and through its recommendation for a "safe-space" in which agreement holders could undertake innovation and experimentation (Defra, Towards a flourishing uplands, 2026; Defra, Independent Review of Protected Site Management on Dartmoor, 2023).
- 11.13 The same principle is reflected in IUCN guidance, which states that the uptake and sustainability of wildlife-management measures are likely to be greater where affected stakeholders participate in their selection, design and implementation (IUCN SSC, Guidelines on Human-Wildlife Conflict and Coexistence, 2023, Chapter 3). Taken together, these sources support standards which are developed with practitioners, tailored to local circumstances, monitored against measurable outcomes and capable of adaptation where the evidence shows that change is required.
- 11.14 The available evidence indicates that the design of the regulatory and incentive framework can itself affect whether desired management is practicable and sustained. Noyes et al. (2026) identified gaps in the availability and coordination of agri-environment measures relevant to curlew conservation, while Muyima, Kleynhans & de Lange (2025) provide peer-reviewed evidence from a different management system that liability, permitting delays and implementation costs can inhibit adoption even where an intervention is assessed as economically beneficial. Defra's own 2026 uplands review similarly cautions that technically appropriate interventions can fail where the practical and social conditions required for delivery are not understood.
- 11.15 This does not mean that regulation, permitting or environmental safeguards necessarily reduce adoption, or that requirements should be relaxed simply because practitioners find them burdensome. Appropriate regulation can provide clarity, minimum standards and protection against environmental harm. The relevant question is whether each requirement is demonstrably connected to the outcome sought and whether the cumulative framework enables that outcome to be delivered effectively in practice. Monitoring should therefore examine implementation and environmental performance as well as formal compliance.
- 11.16 Taken together, the evidence suggests that adoption and maintenance of good practice depend not simply on whether a requirement is mandatory or voluntary, but on whether it has a credible evidential purpose, is practically deliverable, provides sufficient continuity and coordination, imposes proportionate costs and liabilities, involves those responsible for delivery, and allows performance to be measured and recognised. Those factors should be considered when comparing additional statutory requirements with improved guidance, incentives, accreditation, adaptive management or earned-recognition approaches.

Section A: Call for Evidence Questions - Protected sites and habitats

Question 12: What evidence exists of links between gamebird activities and damage to protected sites or habitats, or positive impacts on biodiversity within protected sites?

- 12.1 The Moorland Association's response relates principally to red grouse shooting and the associated management of upland habitats. Red grouse are wild birds managed in situ rather than reared and released, a distinction which Defra itself recognises in this Call for Evidence.
- 12.2 A substantial proportion of grouse-moor management takes place within or alongside nationally and internationally protected upland habitats. It is therefore important that impacts are assessed at the level of the particular management practice and the particular protected feature, rather than attributing either damage or benefit simply to the presence of grouse shooting.

Grouse-moor management and protected sites

- 12.3 There is a significant spatial relationship between grouse-moor management and protected upland landscapes. The 2023 evidence review *Sustainable Driven Grouse Shooting?* reports that shooting estates accounted for 29% of upland SSSI area, compared with an expected 16% if they were randomly distributed across the uplands. It also reports that 74% of upland Special Protection Areas in England are managed as grouse moors.
- 12.4 These figures do not, by themselves, demonstrate that grouse-moor management caused the designation of those sites or that it is responsible for their present condition. They do, however, demonstrate that grouse-moor management substantially overlaps with some of England's most important protected upland habitats and bird assemblages. Any assessment of impact should therefore consider both the management which has operated alongside those protected features and the consequences of changing that management.

Evidence of positive and negative impacts

- 12.5 There is evidence that some management associated with grouse moors can produce positive biodiversity outcomes within upland habitats. A substantial body of research concerns the effects of lawful control of generalist predators on ground-nesting birds, including species which are themselves features of conservation interest on protected uplands. Experimental, observational and review evidence includes Fletcher et al. (2010), Mustin et al. (2018), Littlewood et al. (2019), Baines et al. (2023) and Baines (2025).
- 12.6 The experimental work of Fletcher et al. (2010) is particularly relevant. Breeding success of several ground-nesting moorland birds, including lapwing, golden plover and curlew, was substantially higher where legal predator control was undertaken, and breeding numbers subsequently increased under predator control and declined in its absence. More recent paired-site research found curlew productivity approximately four times higher on grouse moors subject to legal generalist-predator control than on paired non-grouse moors, associated with lower indices of foxes and corvids (Baines et al., 2023). The latter was observational rather than experimental and does not establish that the same relationship will occur on every protected site. Together, however, the studies provide evidence that predator abundance and lawful predator management can materially affect the breeding outcome of protected upland bird species.
- 12.7 Longer-term follow-up evidence points in the same direction while requiring similar caution. Baines (2025) resurveyed four plots around Otterburn approximately ten years after the earlier experimental predator-control programme had ceased. Carrion-crow abundance and the fox index had increased, while golden plover, snipe, red grouse and curlew had declined substantially and black grouse and grey partridge were no longer recorded on the plots. The later resurvey was observational, confined to one study area and occurred against wider national changes in some of

the species concerned; it therefore does not independently establish predation as the sole cause. Its relevance is that changes in predator abundance can form part of the causal chain affecting wildlife features on upland sites and should be considered alongside habitat condition and other pressures (Baines, 2025).

- 12.8 Natural England’s own evidence review for common snipe provides a useful illustration of why these effects cannot be generalised across species or sites. It records evidence from Scotland that restoration of grouse-moor management, including predator control, was associated with increased breeding snipe, while noting that the northern England predator-control experiment did not demonstrate the same benefit for that species. This illustrates why site, species and management practice need to be considered separately rather than assuming that “grouse management” has a uniform effect.
- 12.9 There is also primary scientific evidence concerning the effects of vegetation-management practices on blanket bog. Whitehead & Baines (2018) examined vegetation responses following prescribed burning on blanket peat, while Whitehead, Weald & Baines (2021) examined a chronosequence of burns on a Scottish blanket-bog grouse moor. The latter found higher Sphagnum cover on plots eight to ten years after burning than on unburned controls, higher cotton-grass cover across burned plots and no overall effect of burn age on plant or moss diversity. These studies were observational, site-specific and do not demonstrate that burning is appropriate on every blanket-bog site. They do, however, show that post-burning vegetation responses are more complex than a simple assumption of uniform habitat loss (Whitehead & Baines, 2018; Whitehead, Weald & Baines, 2021).
- 12.10 Experimental evidence also demonstrates that different vegetation-management treatments can produce different ecological effects. Heinemeyer et al. (2019) found that cutting and burning produced different effects on peat-surface structure and microtopography, including effects associated with machinery used for cutting. A subsequent long-term replicated study found that burning, cutting and non-management produced different effects on the elemental composition and nutritional quality of heather, with most treatment differences diminishing as vegetation recovered over time (Heinemeyer et al., 2025a). Neither study should be treated as demonstrating that one technique is environmentally preferable in every circumstance: they instead reinforce the need to assess the specific intervention, site conditions and protected feature concerned.
- 12.11 Grazing is another potentially important confounding pressure. Long-term work at Langholm found substantial historic loss of heather during a period of heavy sheep grazing, followed by recovery of heather after major reductions in sheep numbers and destocking of parts of the moor (Ludwig et al., 2020). This is particularly relevant when attributing the condition of protected moorland habitat: observed changes in vegetation may reflect the interaction of grazing, burning or cutting, hydrology, climate and other pressures rather than any one management practice in isolation.
- 12.12 The MA equally recognises that management associated with grouse shooting is capable of causing harm where an intervention is inappropriate for the site, location or protected feature, or is undertaken to an inappropriate standard. The evidence above should not be read as demonstrating that prescribed burning, predator control or any other intervention is universally beneficial. Where robust evidence demonstrates damage to a protected habitat or designated feature, that pressure should be addressed. The evidential requirement should be symmetrical: positive and negative claims should identify the particular management intervention, the protected feature affected and the evidence linking the two.

Attribution at practice and protected-feature level

12.13 It is therefore important to distinguish between:

- the act of grouse shooting itself;
- the wider land-management system associated with grouse shooting;
- individual management practices within that system; and
- whether a particular practice is being undertaken appropriately or inappropriately on a particular site.

12.14 Without those distinctions there is a risk of attributing an impact to “grouse shooting” which may actually result from a specific management intervention, historic drainage, grazing pressure, hydrological change, wildfire, climate or another environmental pressure.

12.15 The same point applies in the opposite direction. The presence of grouse shooting on a protected site is not, by itself, proof of biodiversity benefit. Where positive outcomes are claimed, the evidence should identify the relevant practice and the species or habitat response.

12.16 The MA therefore considers that evidence relating to protected sites should be assessed site by site, feature by feature and pressure by pressure, with clear consideration of causation. The existence of a management activity on a protected site should not itself be treated as evidence that it has caused the condition of that site, positively or negatively.

The counterfactual for protected sites

12.17 It is also important to consider the counterfactual. Where management associated with grouse shooting supports habitat maintenance, lawful predator management, species monitoring, wildfire management or other conservation activity within a protected site, an assessment of policy change should consider what is likely to happen to those activities if the management system which currently supports them is materially changed or removed.

Langholm Moor: changing the management system

12.18 Langholm Moor provides a useful protected-site example of why that counterfactual matters. Langholm-Newcastleton Hills is both an SSSI and SPA and was the subject of a long-running demonstration project involving Scottish Natural Heritage, Natural England, the RSPB, GWCT and Buccleuch Estates. The resulting review should not therefore be characterised as evidence produced by the shooting sector alone. The RSPB and Natural England were formal project partners; the Seven Year Review states that it was approved by the project’s directors and that the evidence within it had been reviewed by the project’s scientists and advisers. The detailed progress statements were also reviewed through the project’s scientific and technical groups before approval by the Project Board.

12.19 Following the cessation of driven grouse shooting and the substantial reduction of keeping after the earlier Joint Raptor Study, the project partners recorded increases in fox and carrion-crow abundance, further declines in red grouse, breeding waders falling to very low numbers and hen harriers declining from their earlier peak; both the SSSI and SPA were also found to be in unfavourable condition.

12.20 Grouse-moor management was restored from 2008 under the Langholm Moor Demonstration Project, including habitat restoration, reduced grazing, lawful control of generalist predators, heather management and monitoring. By the seven-year review, the project had met its targets for increasing the extent and improving the condition of heather habitat, and the number of nesting hen harriers

had exceeded the project target. Peer-reviewed analysis of the restoration period found that curlew increased by an average of approximately 10% per year, golden plover by 16% and snipe by 21%, with the authors concluding that restoration of predator control as part of grouse management could reverse declines in some breeding waders (Ludwig, Roos & Baines, 2019).

- 12.21 Longer-term vegetation research at Langholm also demonstrates the importance of separating the different components of the management system. Ludwig et al. (2020) found that heather cover had declined substantially during an earlier period of heavy sheep grazing and subsequently increased following major reductions in sheep numbers and destocking. The result does not demonstrate that grouse-moor management as a whole caused habitat recovery; rather, it identifies grazing pressure as an important independent driver of the protected upland vegetation. This reinforces the need to distinguish the effects of grazing, predator management, vegetation management and other interventions when interpreting protected-site outcomes.
- 12.22 Langholm should not be treated as a controlled experiment demonstrating that withdrawal or restoration of grouse-moor management alone caused those changes. It was a scientifically monitored demonstration project in which several management variables changed together, and individual species responded differently. Red grouse did not recover sufficiently to meet the project's predetermined objective of commercially viable driven shooting. Its relevance to this question is therefore not that the Langholm management system was uniformly successful, but that changing the management system on a protected upland site altered habitat, predator and species outcomes in different directions. Defra should assess those constituent mechanisms and the likely replacement management regime rather than treating either the presence or removal of grouse shooting as a single environmental intervention.

Langholm's predetermined test of success

- 12.23 The RSPB's subsequent interpretation of Langholm requires an important qualification. Its 2020 environmental review states that the project restored red grouse to a level at which shooting of smaller bags "would have been sustainable". That is a retrospective assessment of what might theoretically have been harvested; it was not the outcome against which the demonstration project had agreed to test success.
- 12.24 The project's stated objective was to re-establish Langholm as a driven grouse moor while maintaining a viable hen-harrier population. Its agreed red-grouse target was 2,000 birds (1,000 brace) shot in one year, with sustainable employment of keepers. The project calculated that this required an autumn population of approximately 6,000 grouse and, following revision of the area of core grouse habitat, a July density of approximately 200 grouse per km². That target was not achieved. No grouse were shot during the Langholm Moor Demonstration Project; the final project assessment concluded that grouse had not recovered sufficiently for commercial driven shooting; and the keeping operation ceased before the end of the project (Langholm Moor Demonstration Project, 2014 and 2019; Grouse Moor Management Review Group, 2019).
- 12.25 This distinction is important. Langholm produced positive conservation outcomes, including improvements in heather habitat and some bird populations, and those outcomes should be recognised. But the central demonstration concerned whether a management system capable of supporting viable driven grouse shooting could be restored alongside the agreed conservation objectives. On the project's own predetermined measure, that demonstration did not succeed. A later proposition that a smaller number of grouse could theoretically have been shot should therefore not be presented as though the project's viability objective had been achieved.

- 12.26 The 2023 review is relevant in this respect because it repeatedly emphasises that alternative uses of moorland would themselves produce different environmental outcomes and that those alternatives have not always been assessed with the same evidential intensity as existing grouse-moor management.
- 12.27 The MA therefore supports an evidence-led approach which identifies which individual practices deliver positive outcomes on protected sites, which create demonstrable risks, and how standards can be used to retain the former while reducing the latter. In our view, that approach is more likely to improve the condition and resilience of protected upland habitats than treating grouse shooting itself as a single environmental pressure.

Question 13: What evidence exists on whether, and how, high standards of practice reduce risks to protected sites and habitats?

- 13.1 High standards of practice can reduce risks to protected sites where they address an identified pressure on a particular protected feature and are capable of delivering a measurable environmental outcome. The relevant test is therefore not simply whether a standard has been adopted or a prescribed process followed, but whether the practice required by that standard addresses the risk concerned and produces the intended result.
- 13.2 There is direct peer-reviewed UK evidence of this principle in relation to prescribed vegetation burning. Baker et al. (2026) measured temperatures and fire severity during eight prescribed burns undertaken at four UK sites by trained teams operating according to the first UK vegetation-fire standards. Although above-ground flame temperatures were high, mean maximum soil temperatures at 2-3 cm depth remained below 17°C; only four of 189 thermocouples exceeded 70°C and those exceedances lasted for a mean of approximately 29 seconds. Fire-severity assessments found no below-ground organic-matter loss, and measured temperatures were far below those required for pyrolysis of peat. The study therefore provides directly measured evidence that trained practitioners, appropriate operating conditions and defined burning standards can materially limit one identified risk to protected organic soils (Baker et al., 2026).
- 13.3 That result should be interpreted within its stated limits. Baker et al. examined eight burns undertaken by experienced teams under relatively mild conditions during the legal burning season. It did not assess repeated burn rotations, long-term carbon balance, vegetation recovery or wider biodiversity effects, and cannot demonstrate that every prescribed burn undertaken on a protected site will produce the same outcome. Its relevance to this question is precisely that distinction: a high standard is meaningful where the operating conditions, practitioner competence and procedures can be connected to a measured reduction in the environmental risk concerned.
- 13.4 The wider scientific literature supports the importance of distinguishing controlled prescribed fire from wildfire when assessing that risk. Doerr et al. (2025), in a global evaluation of soil heating during wildfires and prescribed burns, found very wide variation in soil-heating intensity and duration according to fire behaviour, vegetation, fuel and soil conditions. Reported prescribed-fire temperatures in some shrubland systems were substantially higher than those measured beneath the UK burns examined by Baker et al. (2026). The global evidence is not directly transferable to English blanket peat because it encompasses very different ecosystems and fire types. It does, however, demonstrate that “burning” is not a single exposure: fire behaviour, fuel condition, weather, soil and operational practice materially affect the degree of soil heating (Doerr et al., 2025).
- 13.5 Independent Scottish evidence provides a further, landscape-scale perspective. Fielding et al. (2024) compared mapped prescribed burning with wildfire occurrence across approximately 39,000 km² of

Scottish moorland. Prescribed burning occurred across 13.1% of the moorland studied and wildfire across 1.1%; 96% of the total mapped wildfire area occurred outside moorland mapped as managed by prescribed burning. Three-quarters of the wildfire area on moorland occurred on peat, whereas only around one-third of the mapped prescribed-burning area was on peat.

- 13.6 Fielding et al. (2024) expressly caution that this spatial association does not demonstrate that prescribed burning itself caused the lower wildfire occurrence. Wildfire occurrence was not progressively lower at increasing levels of prescribed-burning intensity, and the authors identify several plausible alternative or additional explanations, including estate wildfire-prevention strategies, trained personnel and equipment, firebreaks, grazing and differences in visitor pressure. They also note evidence that some prescribed fires escape, although such events may be controlled before becoming large wildfires. The study therefore does not establish prescribed burning as a universal wildfire-prevention measure. It does, however, provide independent evidence that the wider management system (including preparedness, training, equipment and fuel management) may be relevant to wildfire exposure on protected moorland and should itself be assessed rather than assuming that the presence of managed fire necessarily increases wildfire risk.
- 13.7 These studies illustrate why “high standards” should be defined in operational and outcome terms. On upland protected sites, relevant standards may include practitioner competence and training; suitable weather and fuel-moisture conditions; appropriate fire behaviour and burn size; protection of sensitive soils, habitats and features; sufficient people and equipment to contain the intervention; monitoring of the resulting environmental effect; and the ability to stop or adapt management where the intended outcome is not being achieved. The appropriate standard will differ between management activities and protected features, but in each case its purpose should be to control a defined risk and its effectiveness should be capable of evaluation.
- 13.8 The same evidential discipline should apply where a prescribed practice does not achieve the desired result. As noted in response to Question 10, practitioner monitoring of Sphagnum inoculation following approved vegetation cutting on Peak District deep-peat SSSIs has recorded very low survival in some locations. Those case studies are not controlled scientific experiments and do not demonstrate that Sphagnum inoculation is ineffective generally. They nevertheless illustrate why formal compliance with an approved process should not be treated as equivalent to successful habitat recovery: monitoring must be capable of identifying failure as well as success and allowing practice to be adapted.
- 13.9 Defra should therefore assess standards through a clear evidential sequence: what protected feature is at issue; what pressure or risk has been identified; what practice or standard is intended to address it; what evidence supports the causal mechanism; was that standard implemented; and what measured environmental outcome followed? Practices which demonstrably reduce risk or improve protected features should be retained and refined, while practices which fail to deliver the intended result should be capable of adaptation. This allows standards to be judged by environmental performance rather than treating either compliance or prohibition as an outcome in itself.

Question 14: What evidence is there that gamebird release or shooting affects the condition of Sites of Special Scientific Interest (SSSIs), or the wildlife, habitats or geological features for which they are protected?

- 14.1 The Moorland Association’s response relates principally to red grouse shooting and associated upland land management. Red grouse are wild birds managed in situ and are not reared and released, a distinction Defra itself makes in this Call for Evidence.

- 14.2 The MA does not hold specific evidence concerning impacts on geological features of SSSIs and therefore confines this response principally to habitats and wildlife features.

Interpreting SSSI condition and causation

- 14.3 Care is needed when interpreting evidence about SSSI condition. The fact that a SSSI is managed for grouse shooting does not itself establish that grouse shooting has caused either favourable or unfavourable condition. In the case of red grouse, much of the relevant evidence concerns the associated land-management practices rather than the act of shooting itself. The appropriate question is therefore which particular practice affects which notified feature, in what way, and with what evidence of causation.

Grouse-moor management and protected-site features

- 14.4 There is substantial overlap between grouse-moor management and protected upland sites. The 2023 review *Sustainable Driven Grouse Shooting?* reports the results of the GWCT Grouse Moor Survey, in which shooting estates accounted for 29% of upland SSSI area, compared with an expected 16% if shooting estates were randomly distributed across the uplands. The same review reports that 74% of upland Special Protection Areas in England are managed as grouse moors.
- 14.5 These figures do not establish that grouse-moor management caused those sites to be designated or that it is responsible for their present condition. They do, however, demonstrate that grouse-moor management has coexisted over substantial areas with habitats and species considered sufficiently important to warrant national and international protection.
- 14.6 There is primary scientific evidence that some management associated with grouse moors can affect wildlife features relevant to protected upland sites. Fletcher et al. (2010) experimentally demonstrated substantially higher breeding success for several ground-nesting birds, including golden plover, lapwing and curlew, where legal generalist-predator control was undertaken. More recent paired-site work found substantially higher curlew productivity on grouse moors subject to predator control than on paired non-grouse moors, associated with lower indices of foxes and corvids (Baines et al., 2023). Both studies concern particular management interventions and species responses rather than the act of grouse shooting itself.
- 14.7 Longer-term evidence from Otterburn provides additional, though observational, evidence. Baines (2025) resurveyed plots approximately ten years after the earlier predator-control experiment had ceased and recorded substantial increases in fox and carrion-crow indices alongside declines in golden plover, snipe, curlew and red grouse and the disappearance of black grouse and grey partridge from the study plots. The later resurvey was confined to one study area and occurred against wider national changes in several species, so it does not establish predation as the sole cause. It nevertheless demonstrates why predator abundance is a potentially material pressure on notified upland bird features and should be assessed separately from habitat condition and other management variables (Baines, 2025).
- 14.8 Current evidence from Upper Teesdale provides a further example. Baines & Aebischer (2026) estimated approximately 1,764 breeding curlew pairs across the study landscape. Curlew density on blanket bog managed by burning or cutting was more than twice that recorded on unmanaged blanket bog within the study, estimated productivity was around one fledged chick per pair, and repeat surveys approximately a decade apart indicated broadly stable numbers. The study was observational and habitat, farming, predator management, altitude and vegetation management were interrelated, so these outcomes cannot be attributed to one intervention. They nevertheless provide

recent peer-reviewed evidence that protected upland bird features can respond to the combined management context of a grouse-moor landscape (Baines & Aebischer, 2026).

- 14.9 Natural England's own 2026 assessment of common snipe illustrates why those responses should not be generalised. It records that restoration of grouse-moor management, including predator control, was associated with increased breeding snipe at Langholm (Ludwig, Roos & Baines, 2019), while the northern England predator-control experiment of Fletcher et al. (2010) did not demonstrate the same response for that species. Site, species and intervention therefore need to be considered separately.
- 14.10 The same requirement applies to protected habitats. Whitehead & Baines (2018) examined vegetation responses following prescribed burning on blanket peat, while Whitehead, Weald & Baines (2021) examined post-burning vegetation across a chronosequence on Scottish blanket bog. The latter recorded higher Sphagnum cover on plots eight to ten years after burning than on unburned controls, greater cotton-grass cover across burned plots and no overall effect of burn age on plant or moss diversity. These were site-specific observational studies and do not demonstrate that burning is appropriate, or beneficial, on every blanket-bog site. They do demonstrate that vegetation responses following prescribed management are not adequately represented by assuming a uniform deterioration of peatland vegetation (Whitehead & Baines, 2018; Whitehead, Weald & Baines, 2021).
- 14.11 Experimental work also demonstrates that alternative vegetation-management techniques are not ecologically interchangeable. Heinemeyer, Berry & Sloan (2019) recorded different effects of cutting and burning on blanket-bog surface structure and microtopography, including effects associated with tracked cutting machinery. More recent long-term replicated work found that burning, cutting and non-management produced different effects on the elemental composition and nutritional quality of heather, with treatment differences generally diminishing as vegetation recovered over time (Heinemeyer et al., 2025a). Neither study establishes that one intervention is environmentally preferable in every protected-site context; their importance here is that the technique, frequency, site conditions and protected feature all matter.
- 14.12 Grazing pressure is a further potentially important driver of protected-site vegetation. Long-term analysis at Langholm found substantial historic heather loss during a period of heavy sheep grazing and subsequent recovery following major reductions in sheep numbers and destocking (Ludwig et al., 2020). This is relevant to causal attribution because changes in heather extent or vegetation condition may result from grazing, hydrology, burning or cutting, climate and their interaction rather than from grouse shooting as a category of land use.
- 14.13 The MA equally recognises that inappropriate management can damage protected features. The evidence above should not be interpreted as establishing that predator control, burning, cutting or any other management technique is universally beneficial. Where burning is undertaken in inappropriate locations, under unsuitable conditions or at inappropriate frequency, or where another management intervention is demonstrated to be damaging a notified feature, that pressure should be addressed. The evidential test should be symmetrical: Defra should identify the particular protected feature, the particular pressure or intervention and the evidence connecting the two before attributing either favourable or unfavourable condition to grouse-moor management generally.

Moor House, Upper Teesdale: condition is not causation

- 14.14 SSSI condition also needs to be handled with considerable caution as a proxy for the environmental performance of a particular land use or land manager. Moor House, Upper Teesdale provides a useful illustration. Moor House was one of England's first National Nature Reserves, established in 1952, and is Natural England's only upland NNR. It therefore provides a particularly relevant comparator when considering the interpretation of condition data from privately managed upland SSSIs.
- 14.15 Published SSSI unit-condition data reviewed by the MA record five of the 25 Moor House, Upper Teesdale units as favourable and 20 (80%) as not currently recorded in favourable condition. Of those 20 units, 15 are recorded as unfavourable recovering, four as unfavourable declining and one as destroyed (see Annex 3). That headline figure should itself be interpreted carefully. "Unfavourable" is not a single condition or trajectory: an unfavourable-recovering unit may be subject to management intended to move the notified feature towards favourable condition even though it has not yet reached that condition.
- 14.16 The MA does not suggest that the 80% figure demonstrates that Natural England, or state conservation management, caused those units to be in unfavourable condition. That would make precisely the attribution error against which we caution. Condition may reflect historic pressures, grazing, atmospheric deposition, hydrology, previous land management, environmental change and the time required for habitat recovery. Government assessments of the wider Moor House, Upper Teesdale protected site themselves identify a range of pressures behind unfavourable condition.
- 14.17 The relevance of Moor House is therefore narrower but important. It demonstrates that condition status and causal attribution are different evidential questions. A site may remain formally unfavourable under long-term conservation management for reasons which pre-date the current management, arise from multiple pressures, or reflect the time required for recovery. The same evidential caution should be applied when interpreting unfavourable condition on privately managed grouse moors.

Wider condition data: National Nature Reserves and managed uplands

- 14.18 The same point is visible beyond Moor House. Using the Natural England National Nature Reserve dataset to identify England's 221 NNRs, the MA has matched those reserves to available SSSI unit-condition records (see Annex 4). The resulting compilation covers 3,509 SSSI units. Approximately 52% are recorded as favourable, 34% as unfavourable recovering, 7% as unfavourable no change and 7% as unfavourable declining, with only very small numbers in the remaining condition categories. These figures should not be interpreted as evidence that NNR management caused the condition recorded. National Nature Reserves encompass different habitats, management histories, environmental pressures and stages of recovery, and land may have entered conservation management precisely because intervention was required. The narrower relevance is that even land managed expressly for nature conservation can contain substantial areas which have not yet reached favourable condition. Condition status alone therefore cannot identify either the cause of the condition or the effectiveness of the present management regime.
- 14.19 A separate MA compilation of SSSI unit-condition records across six managed upland areas provides a complementary illustration. Of 801 unit records examined across the North York Moors, Calderdale, Bowland, the Peak District, Nidderdale and the Yorkshire Dales, 104 (13.0%) were recorded as favourable, 598 (74.7%) as unfavourable recovering, 76 (9.5%) as unfavourable no change, 22 (2.7%) as unfavourable declining and one as destroyed. This is a selected compilation rather than a nationally representative or area-weighted sample and should not be used to estimate the condition of English upland SSSIs as a whole. It nevertheless illustrates an important

interpretative point: a simple statement that approximately 87% of these unit records are “unfavourable” would conceal the fact that the large majority are recorded as recovering. Defra should therefore distinguish condition from trajectory when using SSSI classifications as evidence.

- 14.20 The Peak District subset also permits a limited comparison according to whether units are recorded as shot over. Of 251 unit records, 209 are identified as shot over and 42 as not shot over. Both groups are dominated by units recorded as unfavourable recovering: 78.0% of the shot-over units and 76.2% of the not-shot-over units. Favourable condition is recorded for 12.9% and 9.5% respectively. This is not a controlled or matched comparison and does not demonstrate that grouse shooting either improves or worsens SSSI condition: the groups may differ in habitat, location, ownership, management history and other relevant pressures. Its relevance is narrower. Within this dataset, condition classification does not map in any simple way onto the presence or absence of shooting, reinforcing the need to identify the particular feature, pressure, management intervention and causal mechanism concerned.

Lake Vyrnwy: mixed outcomes under conservation management

- 14.21 Lake Vyrnwy provides a second, and different, illustration of the same evidential problem. The RSPB has managed the in-hand upland farm there since 1996 within a landscape much of which forms part of the Berwyn SSSI, SPA and SAC. Its management plans established explicit objectives for protected upland habitats and priority bird species. The 2007 plan sought, among other objectives, to maintain the SSSI breeding-bird assemblage in favourable condition, increase curlew from two pairs to a five-year mean of five pairs and maintain a five-year mean of 15 lekking male black grouse.
- 14.22 Denny (2025), drawing substantially on RSPB management plans and bird-count data supplied by the RSPB, records mixed subsequent outcomes. Curlew numbers in the Lake Vyrnwy area had averaged 24 pairs between 1978 and 1986, when the RSPB had an advisory rather than management role. By 2000-2006 they averaged around two pairs, and in 2024 one pair was recorded nesting in the Lake Vyrnwy area, on farmland adjoining the RSPB farm. Seven lekking male black grouse were recorded in 2024 against the management-plan target of a five-year mean of 15. The report itself cautions that black grouse at Lake Vyrnwy are at the southern geographical margin of their UK range and that bird numbers can fluctuate for reasons including weather.
- 14.23 Those figures should not be interpreted as demonstrating that RSPB management caused the decline of either species. Lake Vyrnwy has experienced substantial changes in grazing, forestry, hydrology, vegetation management and predator management, and the RSPB operates within constraints arising from land ownership, water-supply interests and statutory requirements. Nor have the outcomes been uniformly negative: the report records substantial blanket-bog restoration and positive responses for a number of other species, including hobby, pied flycatcher, redstart, wood warbler and willow tit, with golden plover recorded in 2024 following rewetting work.
- 14.24 The relevance of Lake Vyrnwy is therefore not that one conservation-management model has “failed” and another should replace it. Rather, it demonstrates that even long-term, conservation-led management of a highly protected upland landscape can produce different outcomes for different habitats and species, and can involve difficult trade-offs between grazing, hydrology, vegetation structure, predator management and other objectives. It reinforces the MA’s central point that Defra should identify the particular pressure, management intervention and measured outcome before attributing either favourable or unfavourable condition to a particular land use. The same evidential standard should apply to grouse moors and to alternative management regimes. A comparable species-level trade-off is recorded in the RSPB-commissioned Geltsdale case study discussed under Question 9, where conservation-led management was associated with increased

overall biodiversity while golden plover and curlew declined and other species, including black grouse, benefited (Rayment, 2022).

- I4.25 Consequently, the fact that a SSSI unit on a grouse moor is classified as unfavourable should not itself be treated as evidence that grouse shooting, or grouse-moor management generally, caused that condition. SSSI condition is evidence about the state of the protected feature; it is not, without a further evidential chain, evidence identifying the cause.

Government evidence on condition and attribution

- I4.26 This distinction is consistent with the Government's own Environmental Improvement Plan 2025. The EIP focuses on SSSI features and on whether actions are on track to achieve favourable condition, supported by monitoring, evaluation and adaptive delivery. Defra's subsequent reporting also recognises that protected-site condition can reflect multiple interacting pressures requiring coordinated action. The appropriate evidential question is therefore not simply whether a feature is favourable or unfavourable, but which pressures are preventing favourable condition, what evidence identifies those pressures, and whether the proposed management response is demonstrably moving the feature towards the desired outcome.
- I4.27 The independent Dartmoor Review commissioned by Defra provides further support for this caution. The review found significant limitations in the evidence available for interpreting protected-site condition, including incomplete historic monitoring, uncertainty over the condition of SSSIs when first notified, and unresolved causal relationships between management, climate and other environmental pressures. It subsequently concluded that, without consistent monitoring, it was impossible to establish whether some SSSIs had ever been in favourable condition or what their long-term trajectory had been. The review's scientific panel also emphasised that condition assessment is a rapid appraisal tool and should be accompanied by proper data capture, suitable baselines and scientific evaluation (Defra, Independent Review of Protected Site Management on Dartmoor, 2023, paras 4.2-4.5 and 16.1-16.5).
- I4.28 Recent statutory scientific work also illustrates the difficulty of reducing peatland condition to a single vegetation characteristic or threshold. A NatureScot-commissioned review by Andersen et al. (2026) found that there is no universally agreed definition of peat, peatland or "active" peatland and cautioned that numerical thresholds used for classification are necessarily artificial simplifications of ecological continua. The review also notes that active blanket bog can contain heather and other ericaceous vegetation and that functioning peatland landscapes may contain areas undergoing both peat accumulation and erosion. It argues for assessment of ecological functioning and capacity for peat formation rather than relying uncritically on uncertain quantitative proxies (Andersen et al., 2026).
- I4.29 That report was commissioned in a Scottish planning and peatland-assessment context and does not assess English SSSI condition or the effects of grouse-moor management. Its relevance is methodological. Where Defra relies upon vegetation composition, dominant species, peat depth or another condition indicator as evidence of the effect of a particular management practice, it should establish that the indicator is an appropriate proxy for the ecological function or protected feature actually at issue rather than treating the proxy and the outcome as synonymous.
- I4.30 The MA's upland SSSI compilation also illustrates the importance of evidential currency. The recorded date of last inspection for 582 of the 801 unit records examined (72.7%) is 2016 or earlier (see Annex 5). This does not establish that no subsequent site monitoring, management information or other ecological evidence exists, and the MA does not suggest that an older condition assessment

is necessarily invalid. It does mean, however, that Defra should establish the date and current evidential status of any condition assessment on which it proposes to rely. A historic classification should not automatically be treated as a current measure of either environmental performance or the effects of present-day management without checking whether the underlying evidence remains representative.

- I4.31 This does not mean that an unfavourable SSSI assessment should be disregarded. It means that condition status should not, by itself, be treated as proof of the cause of that condition or of the effectiveness of a proposed remedy. The Dartmoor Review also warned that, in a changing environment, historic protected-site targets may in some cases become difficult or impossible to achieve and that irreversible management responses should therefore be approached cautiously where ecological relationships remain uncertain (Dartmoor Review, 2023, paras 4.3-4.5). That is directly relevant to the interpretation of SSSI evidence in this Call for Evidence.
- I4.32 That caution is also reflected in current Government policy. Commitment 67 of the Environmental Improvement Plan 2025 is expressly to make terrestrial protected-site designation and management “more dynamic and adaptive to the changing climate”. It commits Natural England to incorporate climate-change risk assessments into SSSI condition assessments and to develop adaptive delivery plans for sites identified as being at high climate risk (Defra, Environmental Improvement Plan 2025, Commitment 67). This reinforces the need to interpret condition and management requirements in the context of changing environmental pressures rather than assuming that ecological baselines, pressures or appropriate management responses remain static over time.

The evidential test for reliance on SSSI condition

- I4.33 Where Defra proposes to rely upon SSSI condition evidence in considering future policy on grouse shooting, the MA therefore considers that the evidence should identify:
- the notified feature concerned
 - the particular condition criterion that is or is not being achieved
 - the specific pressure or management practice considered responsible
 - the evidence linking that pressure to the condition of the feature
 - whether the pressure results from the act of shooting itself or from a particular associated land-management practice
 - what management change is proposed
 - the evidence that the proposed intervention is likely to improve the notified feature without creating material unintended consequences
- I4.34 SSSI condition data should therefore not be used as a proxy for the environmental effect of grouse shooting unless the causal chain between the activity, the identified pressure and the notified feature has been demonstrated. The same evidential discipline should apply to positive outcomes. Where habitat management, lawful predator control, monitoring or other activities associated with grouse management contribute to maintaining protected wildlife or habitats, those effects should also form part of the assessment rather than being excluded because they arise from a land-management system associated with shooting.

Counterfactuals and future management

- I4.35 The counterfactual is equally important. If regulation materially changes the management of an upland SSSI, Defra should consider not merely which existing practices would cease but what management regime would replace them and how that alternative would affect the notified features. Neither continuation nor removal of grouse-moor management should be assumed to improve SSSI condition without evidence.
- I4.36 There is scientific evidence that changes in upland land use can themselves affect species of conservation concern. Warren et al. (2020), analysing 121 black-grouse leks in southern Scotland over the period 1989-2018, found that persistence was associated with larger contiguous areas of moorland and rough grassland and lower surrounding conifer cover; leks on driven grouse moors also held more males. Black grouse nevertheless declined across the region, including on grouse-managed land, so the study does not show that grouse management prevented decline or that woodland is inherently damaging. Its relevance is that habitat fragmentation and the nature and location of replacement land use can materially affect a protected upland species (Warren et al., 2020).
- I4.37 National-scale modelling provides a further counterfactual test. Mason et al. (2025) predicted reductions in red grouse, curlew and golden plover abundance if grouse-moor management ceased, with larger projected declines when management change was combined with future climate change. The analysis was correlative; climate and land cover explained more variation than management for curlew and golden plover; and the authors also identify potential benefits from cessation for controlled predators and raptors affected by illegal killing. The study therefore does not establish that current grouse-moor management is environmentally preferable overall. It does demonstrate that changing the management system can alter species outcomes and that the alternative regime cannot be treated as an ecologically neutral baseline (Mason et al., 2025).
- I4.38 The resulting approach to SSSI evidence should therefore be site-specific, feature-specific and causal. Where a particular practice is demonstrated to damage a notified feature, that pressure should be addressed; where management demonstrably supports the feature, that effect should also be recognised. Defra should identify both the effect of the existing management and the likely effect of the credible replacement regime. Neither the presence of grouse shooting nor an unfavourable SSSI classification should, by itself, be treated as evidence of causation.

Question 15: What evidence is there that particular factors influence compliance with high standards of practice in relation to protected sites and habitats?

- I5.1 The evidence indicates that compliance with high standards of practice on protected sites is influenced not simply by whether a requirement is mandatory, but by whether the requirement is clear, practically deliverable, proportionate to the identified risk, coherent with other regulatory requirements and capable of being connected to the environmental outcome sought. In the protected-site context these factors are particularly important because management may depend upon SSSI consent, Habitats Regulations Assessment, species licensing, vegetation-management rules, agri-environment agreements and other permissions operating together.
- I5.2 Several factors are therefore particularly relevant:
- a. The requirement needs to be site- and feature-specific.** A land manager is better able to comply effectively where the regulator identifies the protected feature concerned, the environmental risk or pressure being addressed, the management outcome sought and the evidence linking the required action to that outcome. Generalised concern about a

category of moorland management is less useful than a clear explanation of what needs to be protected on the particular site.

b. Connected regulatory requirements need to be coherent. Protected upland management may be affected simultaneously by SSSI controls, Habitats Regulations Assessment, species licensing, vegetation-management rules, agri-environment agreements and other permissions. Compliance is made more difficult where these regimes impose overlapping, duplicative or conflicting requirements. Regulatory coordination is therefore itself an important compliance factor.

c. Timescales, continuity and practical deliverability matter. Many upland management activities are seasonal and many conservation outcomes require continuity over several years. Short-duration permissions, late decisions or repeated reconsideration of materially unchanged activities can reduce certainty for staffing, investment and long-term management. Requirements also need to be capable of implementation with the skills, labour, equipment and funding available.

d. Evidence requirements need to be proportionate and capable of resolution. Where a regulator considers that information is insufficient, identifying the particular evidence gap and allowing it to be addressed through targeted information, monitoring, mitigation or changes to method is more likely to secure effective compliance than imposing broad or uncertain requirements which the practitioner cannot readily translate into action.

e. Training and operational clarity matter. Where a management intervention is potentially high risk, standards should specify the conditions, competence and safeguards required for its safe implementation. Baker et al. (2026), for example, measured eight UK prescribed burns undertaken by trained teams operating according to defined vegetation-fire standards. The study found very limited heating of the underlying organic soil under those operating conditions. It did not investigate why practitioners choose to comply with standards, but it demonstrates the practical value of translating an environmental risk into defined operating conditions, training and measurable outcomes against which compliance can be assessed (Baker et al., 2026).

f. Practical engagement matters. Those managing protected upland sites often hold long-term site knowledge concerning vegetation, wildlife, hydrology, grazing, wildfire and previous management. That knowledge does not displace scientific or regulatory evidence, but early engagement can help identify practical constraints, unintended consequences and proportionate ways of achieving the protected-site objective.

15.3 Recent England-specific research provides evidence that scheme design and practical constraints can affect conservation delivery. Noyes et al. (2026), in a Defra Farming in Protected Landscapes-funded assessment of provision for curlew in the Yorkshire Dales, reviewed current agri-environment options and interviewed 18 farmers across 11 farms. The authors identified limitations in the availability of measures required for landscape-scale curlew conservation, including the absence of funding for lethal predator control and difficulties funding facilitators or multi-holding agreements. They also noted that the experienced landscape-scale predator management undertaken by grouse-moor gamekeepers was rarely replicated through agri-environment schemes.

15.4 The Noyes et al. study does not concern statutory compliance with SSSI consents and its farmer sample was small and self-selecting. Its relevance to this question is therefore narrower: it provides

current English evidence that whether desired conservation management can actually be delivered depends in part upon whether the regulatory and incentive framework makes the necessary intervention, coordination and resourcing practically available (Noyes et al., 2026).

- I 5.5 Peer-reviewed international evidence provides further support for the importance of regulatory design while requiring caution in transfer to English protected sites. Muyima, Kleynhans & de Lange (2025) examined prescribed-burning decisions among commercial farmers in South Africa's Langeberg Mountains. Their analysis found that prescribed burning was estimated to produce substantial net benefits through avoided wildfire losses and suppression costs, yet most farmers surveyed did not undertake it. Reported barriers included legal liability if fire escaped, permitting delays and labour costs. The sample was small, the findings were based partly on self-reported information and the South African legal and ecological context differs materially from the English uplands. The numerical findings should therefore not be transferred directly. The narrower relevance is that administrative delay, liability, transaction costs and practical capacity can influence whether a management standard is adopted and implemented even where the intervention itself is perceived to have environmental or economic value (Muyima, Kleynhans & de Lange, 2025).
- I 5.6 Taken together, this evidence supports a compliance framework in which the regulator makes clear what feature is being protected, what risk is being controlled, what action is required, why it is required, what competence or operating conditions are necessary, how compliance and environmental performance will be demonstrated, and how any genuine evidence gap can be resolved. Formal compliance should remain necessary where the law requires it, but the effectiveness of that compliance should ultimately be judged by whether the requirement is practicable and demonstrably protects the relevant feature.
- I 5.7 This is consistent with the MA's wider response to Defra's 2026 consultation on Habitats Regulations Assessment guidance, in which we supported clearer, site-specific and proportionate decision-making, reuse of relevant existing evidence and early identification of material evidence gaps. The issue is not whether protected-site safeguards should be weakened; it is whether those safeguards are expressed and administered in a way that enables land managers to understand and comply with them effectively.
- I 5.8 Defra and Natural England should therefore assess compliance by whether requirements are clear, capable of practical implementation, supported by appropriate competence and resources, and demonstrably protecting the relevant feature, rather than by the volume of regulatory process completed. Monitoring should distinguish formal compliance with a prescribed process from evidence that the intended protected-site outcome has actually been achieved.

Section A: Call for Evidence Questions - Biosecurity and disease

Question 16: What evidence exists of links between grouse shooting, pheasant/partridge release and shooting, and mallard shooting and the spread of disease, including Highly Pathogenic Avian Influenza (HPAI) and other infectious diseases?

- I 6.1 The Moorland Association's response to this question relates only to grouse shooting.

- I6.2 Red grouse are wild birds managed in situ; they are not bred, reared and released for shooting. The MA therefore considers it important to distinguish grouse shooting from activities involving the breeding, rearing and release of pheasants, partridges and mallard when considering potential disease risks.
- I6.3 The MA does not hold specialist veterinary or epidemiological evidence demonstrating a link between grouse shooting and the spread of Highly Pathogenic Avian Influenza or other infectious diseases.
- I6.4 We therefore do not provide a substantive response on disease transmission. This should not be read as evidence either that no such risk exists or that grouse shooting contributes to disease spread. Rather, the MA considers that conclusions in this area should be based on appropriate veterinary, epidemiological and surveillance evidence.
- I6.5 Where Defra assesses evidence submitted on this issue, the MA would encourage a clear distinction between:
- disease risks associated with breeding, rearing and release
 - disease risks associated with wild bird populations
 - the act of shooting itself
 - other management or human activities which may affect transmission risk
- I6.6 Any future policy response should be directed at the activity for which a disease risk is actually demonstrated, rather than assuming that risks associated with released gamebirds apply equally to wild red grouse.

Section A: Call for Evidence Questions - Bird of prey crime

Question 20: What evidence exists of links between gamebird activities and bird of prey crime?

- 20.1 The Moorland Association's response relates principally to red grouse shooting and associated upland land management. The MA unequivocally condemns the illegal killing, injuring or taking of birds of prey, and unlawful interference with their nests or eggs. Any criminal offence should be properly investigated and, where the evidence permits, prosecuted. There is no place for wildlife crime within responsible grouse-moor management.
- The nature and status of bird-of-prey crime evidence**
- 20.2 There is peer-reviewed evidence that illegal killing has affected hen harrier populations and that mortality and disappearance are associated with land managed for grouse shooting. Earlier population work by Etheridge, Summers & Green (1997) examined the effects of illegal killing and nest destruction on hen harrier population dynamics in Scotland. More recently, Murgatroyd et al. (2019), using data from 58 satellite-tagged hen harriers, found that the likelihood of birds dying or disappearing increased with their use of grouse moors and concluded that the observed pattern was most likely explained by illegal killing. This is important evidence and the MA does not suggest that it should be disregarded.
- 20.3 A larger subsequent satellite-tag analysis provides further evidence of a population-level effect. Ewing et al. (2023) analysed survival using 148 satellite-tagged hen harriers in Britain and estimated that illegal killing associated with gamebird management accounted for up to three-quarters of annual mortality. The study found particularly substantial effects on immature birds, with estimated juvenile survival in the absence of illegal killing markedly higher than observed survival. This provides strong peer-reviewed evidence that illegal activity has been a material demographic pressure on the species (Ewing et al., 2023).
- 20.4 The most recent Natural England-commissioned population modelling is also relevant. Macgregor et al. (2025) modelled the rapid increase in English hen harrier breeding attempts during 2018-2024 using observed productivity data and survival estimates derived from Ewing et al. (2023). The modelling did not support increased productivity arising directly from brood management and diversionary feeding as the sole explanation for the population increase. Instead, the most parsimonious explanations required improvement in survival, settlement or both. The authors considered a reduction in killing and/or nest interference coincident with the availability of brood management as one plausible explanation, while stressing that illegal killing continued and that their modelling could not establish whether survival had actually increased or the extent to which illegal killing or nest interference had reduced (Macgregor et al., 2025).
- 20.5 These studies concern population-level patterns, demographic effects and statistical inference. That evidence is highly relevant to the existence and scale of the conservation problem, but it remains distinct from evidence establishing the fate of a particular bird or proving an individual criminal offence. Murgatroyd et al. (2019), for example, recorded four birds with direct evidence of illegal killing alongside 38 birds whose tags stopped unexpectedly and for which the birds were not recovered. An unexplained disappearance can legitimately contribute to a population-level statistical inference without, by itself, establishing how that individual bird died, whether an offence occurred or who was responsible. Both levels of evidence should therefore be reported accurately.
- 20.6 The MA therefore considers that evidence submitted under this question should distinguish clearly between:

- a confirmed criminal offence, where the available evidence establishes that a crime has occurred
- an incident suspected or considered likely to involve criminality, but where this has not been established
- intelligence or statistical association
- an unexplained disappearance or satellite-tag loss
- the geographical occurrence of an incident on or near land managed for grouse shooting
- evidence actually linking an offence, offender or motivation to grouse shooting or associated management

20.7 All of these may constitute relevant evidence, but they do not establish the same thing. Equally, the MA recognises that wildlife crime is difficult to detect and that conviction data alone cannot provide a complete measure of offending. The appropriate response is therefore not to disregard suspected incidents, but to be transparent about the evidential status and limitations of each category.

20.8 This distinction is also recognised in the Scottish Government’s Grouse Moor Management Review Group report. The Group treated evidence of illegal raptor killing seriously and expressly cautioned that recorded incidents are unlikely to provide a complete measure of offending. It identified the relationship between the recorded and actual number of illegal-killing incidents as a significant evidence gap and concluded that discovered cases probably represent only a proportion of actual cases. It also warned that a decline in reported poisoned or shot raptors could not, by itself, be taken as evidence that illegal killing had declined (Grouse Moor Management Review Group, 2019).

20.9 At the same time, the Group distinguished that wider evidential inference from proof of an individual criminal offence. It stated that repeated disappearance of satellite-tracked birds on particular moors was not sufficient to obtain a criminal prosecution because, ordinarily, the disappearance could not be assigned to a particular individual and no carcass was available. The MA considers that both parts of that conclusion are important. Unexplained disappearances and spatial patterns can contribute legitimately to a wider evidential assessment of illegal killing or other bird-of-prey crime, but they should not be described as though they establish the fate of every individual bird, prove that a criminal offence occurred in each case or identify responsibility for it.

20.10 This is the distinction the MA is asking Defra to preserve in the present Call for Evidence: not to discount inferential or statistical evidence, but to describe clearly what each category of evidence establishes, what it supports by inference and what remains unknown.

Satellite-tag evidence

20.11 The MA has undertaken and published its own analysis of satellite-tagged hen harrier data. We have compiled an open register covering 269 satellite-tagged hen harriers tracked by Natural England and the MA since 2002, recording tag identifiers, tagging information, final transmissions and recorded fate. The underlying register and methodology have been published specifically so that they can be scrutinised and challenged.

20.12 This is MA analysis rather than a peer-reviewed finding, and we recognise that aspects of its classification may legitimately be debated. We nevertheless believe it raises material questions about how satellite-tag evidence should be interpreted.

- 20.13 In particular, the analysis highlights that Natural England’s “Missing Fate Unknown” category is not synonymous with criminality. The published definition encompasses circumstances including transmitter failure and birds which may have died in locations from which the transmitter could not subsequently be located or recovered. Satellite transmitters can also stop functioning for known technical and environmental reasons. A stopped signal is therefore evidence that transmission has ceased; its cause requires further evidence.
- 20.14 Applying the MA’s published classification to birds for which usable fate information is available produces an approximately even division: around 53% had final outcomes outside land used for driven grouse shooting or were recorded as natural causes, compared with around 47% whose final fixes were on grouse-shooting land. Applying the same approach to the 58 birds in the Murgatroyd et al. dataset produced a similarly broadly even division.
- 20.15 The MA recognises an important methodological limitation to this comparison. Its classification of final locations is not a substitute for the spatial survival analysis undertaken by Murgatroyd et al. (2019). In particular, the MA analysis does not model each bird’s exposure to grouse-moor habitat through time and should not be interpreted as disproving the statistical association reported in that study.
- 20.16 The purpose of the MA analysis is narrower. It tests what can reasonably be inferred from the final transmission location and recorded fate of an individual bird. On that question, an unexplained cessation of transmission, including one occurring on land managed for grouse shooting, does not by itself establish how the bird died, whether a criminal offence occurred or who, if anyone, was responsible.
- 20.17 The approximately 53%/47% comparison should therefore be treated as descriptive evidence rather than a competing estimate of the effect identified by Murgatroyd et al. For transparency, the MA will make available the underlying register, the classification rules used, the denominator on which the percentages are based and the treatment of unknown or ambiguous cases, so that the analysis can be independently scrutinised and alternative classifications tested.
- 20.18 The register also contains examples which provide useful context. Five final transmissions occurred in the Kielder Forest area, where there is no driven grouse shooting; five occurred on the Isle of Man, again without driven grouse shooting; and twelve final fixes were recorded well away from moorland, including the English Channel, the Spanish coast and residential areas. These observations do not resolve what happened to birds disappearing on grouse moors, but they demonstrate that tag loss and bird disappearance also occur where grouse shooting cannot provide the explanation.
- 20.19 The MA therefore believes that satellite-tag evidence is valuable, but that it should be presented with appropriate information about natural mortality, transmitter failure, recovery rates, spatial resolution and the evidential basis on which an individual fate has been classified.

Concerns already raised with the police

- 20.20 These concerns have not been developed for the first time in response to this Call for Evidence. The MA has raised similar questions directly with the National Wildlife Crime Unit (NWCU) and senior policing representatives over an extended period.
- 20.21 In particular, we have sought greater clarity about the distinction between proven offences, suspected offences, intelligence, statistical associations and unexplained satellite-tag losses; the evidential threshold and methodology used to describe particular areas or estates as wildlife-crime

“hotspots”; geographical attribution of incidents to individual estates; the treatment of contrary or qualifying evidence; and how wildlife-crime information is communicated publicly and supplied to government. These matters remain the subject of constructive engagement between the MA and senior policing representatives.

- 20.22 Those questions have now been partly clarified by an NPCC Freedom of Information response dated 17 September 2026. The NPCC confirmed that it holds recorded definitions and methodology used by the NWCUC to identify bird-of-prey crime hotspots and select estates for contact, including material distinguishing between confirmed offences, reported or suspected incidents, intelligence and satellite-tag disappearances. The detailed methodology was withheld under the law-enforcement exemption in section 31 of the Freedom of Information Act. Significantly, however, the NPCC also stated that it does not hold specific guidance relating to the validation or approval procedures for hotspot designations, explaining instead that such processes are conducted under wider policing guidance including the Criminal Procedure and Investigations Act 1996 and Management of Police Information. This does not demonstrate that hotspot assessments are unvalidated, but it does reinforce the importance of Defra establishing what definitions, classifications, validation and quality-assurance arrangements apply before material derived from those assessments is relied upon for wider policy purposes.
- 20.23 This is directly relevant to the present Call for Evidence. The police have confirmed in writing that the NWCUC reports quarterly to Defra and stated that, should Defra consult on gamebird shooting, “the work of the satellite tagged bird of prey taskforce would form part of the police reply”. Material developed principally for operational policing may therefore contribute directly to the evidence considered by Defra in relation to sector-wide policy. Where the underlying methodology cannot properly be disclosed for operational reasons, that makes it more, not less, important that Defra understands the definitions used, the evidential status of the different categories of information, the applicable validation and quality-assurance arrangements, and the limitations on the conclusions which can properly be drawn from them.
- 20.24 The need for that discipline is reinforced by the NWCUC’s own recent public description of its work. Writing in the Autumn 2026 edition of *Magistrate*, Detective Inspector Mark Harrison described wildlife-crime investigations as “inherently difficult”, acknowledged that delayed discovery can limit forensic opportunities and complicate causation, and explained that cases frequently depend upon specialist ecological, veterinary or forensic evidence. He also recognised that many wildlife activities are lawful when undertaken under licence and that establishing whether a licence did not exist, was breached or was improperly relied upon is “a nuanced area of law”. These acknowledgements underline why material supplied to Defra should distinguish clearly between intelligence, suspicion, an unexplained event, a recorded crime and an offence established by evidence, and should identify the evidential basis and degree of confidence attached to wider claims about scale, location or organised offending.
- 20.25 In making this distinction, the MA’s objective is not to diminish the seriousness of genuine wildlife crime. It is to ensure that evidence, intelligence and suspicion are not inadvertently presented as though they were interchangeable, particularly where the resulting material may subsequently inform regulation affecting an entire land-management sector.

Improving the evidence base

- 20.26 The MA has consequently proposed a single central register of satellite-tagged raptors, subject to legitimate restrictions concerning live investigations and sensitive locations. Such a register could bring together tag and fitting information, final transmissions, recoveries, post-mortem findings,

subsequent police information and the evidential basis for conclusions about individual birds. The MA has published its own register and methodology in support of greater transparency and would welcome independent scrutiny of both.

- 20.27 There is an important precedent for this approach. In December 2017, Defra published, through the Government's MAGIC mapping system, official Raptor Persecution Priority Delivery Group data on confirmed bird-of-prey crime incidents in England and Wales. Defra stated at the time that the maps, initially covering confirmed incidents between 2011 and 2015, would be updated annually.
- 20.28 That commitment was important because it offered the prospect of a common, publicly accessible evidence base rather than different organisations relying upon different datasets and definitions. However, the publicly available dataset appears not to have been updated beyond the original 2011-2015 period. A 2019 report still recorded the intention that it should be updated annually, and by 2020 it was being reported that only confirmed incidents from 2011-2015 remained available through MAGIC.
- 20.29 The MA considers that the loss of an up-to-date, authoritative public record has compounded the present difficulty. In its absence, policymakers and stakeholders increasingly have to rely upon datasets assembled by individual organisations, which may use different definitions, inclusion criteria and evidential thresholds. That makes disputes about the scale, location and attribution of bird-of-prey crime harder rather than easier to resolve.
- 20.30 The need for this is also recognised in Defra's *Future of Rural England Report*. The report describes rural crime (including wildlife offences) as under-reported and poorly understood and concludes that better data and coordinated policing strategies are required. That supports the establishment of a common and authoritative evidence base which distinguishes confirmed offences, suspected offences, intelligence and unexplained incidents, rather than allowing policy to depend upon datasets compiled using different definitions and evidential thresholds.
- 20.31 In the absence of such a record, policy discussion increasingly depends upon datasets assembled by individual organisations, which may use different definitions, inclusion criteria and evidential thresholds. That makes disputes about the scale, location and attribution of bird-of-prey crime more difficult to resolve.
- 20.32 Defra, the police and relevant partners should therefore re-establish a single authoritative and regularly updated public evidence base, with transparent definitions distinguishing confirmed crime, suspected crime, intelligence and unexplained incidents. Satellite-tag information could form part of that wider framework, with appropriate safeguards.
- 20.33 This approach is consistent with the stated purpose of Defra's Call for Evidence, which is expressly intended to improve the evidence base in areas where evidence is limited, incomplete, uncertain or contested.
- 20.34 Where wildlife-crime evidence is relied upon in considering sector-wide policy, its provenance, definitions, classifications, spatial attribution and evidential thresholds must be sufficiently transparent to permit independent scrutiny of the conclusions drawn from it.

Question 21: What evidence exists on whether, and how, high standards of practice reduce these risks?

- 21.1 High standards of practice should form an important part of reducing the risk of bird-of-prey crime, but the available evidence does not justify claiming that adoption of a particular code, assurance scheme or regulatory mechanism has, by itself, caused a measured reduction in offending. Wildlife crime is unlawful behaviour which is inherently difficult to detect, and an offence successfully prevented leaves no directly observable event. The absence of recorded crime following adoption of a standard therefore does not necessarily demonstrate causation, just as an allegation or unexplained incident does not establish that a standard has failed. That absence of causal evidence applies equally to voluntary and statutory mechanisms: it does not establish that standards are ineffective, or that licensing would produce a greater reduction in offending.
- 21.2 There is, however, a strong scientific basis for identifying the risk which effective standards are intended to address. Etheridge, Summers & Green (1997), Murgatroyd et al. (2019) and Ewing et al. (2023) provide evidence, using different methods and periods, that illegal killing has materially affected hen harrier populations and that mortality risk is associated with grouse-moor or gamebird-management contexts. Ewing et al. (2023), using 148 satellite-tagged birds, estimated a particularly substantial demographic effect on juvenile and subadult survival. Effective standards should therefore address a demonstrated conservation risk rather than an abstract or hypothetical one.
- 21.3 The subsequent recovery of the English breeding population provides potentially important evidence about how that risk may be reduced, but it requires careful interpretation. Macgregor et al. (2025) found that direct productivity gains from brood management and diversionary feeding could not explain the rapid increase in breeding attempts during 2018-2024. Their population models instead required improvements in survival, settlement or both. The authors considered it plausible that survival and settlement had responded positively to reduced killing and/or nest interference coincident with the availability of brood management as a mechanism for alleviating conflict between hen harriers and grouse-moor management. They nevertheless stressed that illegal killing continued and that their analysis could not establish whether survival had actually increased or to what extent illegal killing had reduced.
- 21.4 This is important evidence for the present question because it indicates a plausible pathway through which high standards and conflict-management measures could reduce risk without establishing that any one intervention caused the observed recovery. Brood management, diversionary feeding, monitoring, cooperation with statutory bodies and clear legal expectations operate within a wider management system. The appropriate evidential test is therefore whether implementation of such measures is associated over time with improvements in relevant outcomes (including survival, settlement, breeding persistence and confirmed offences against birds of prey) while recognising alternative explanations and continuing unlawful activity.
- 21.5 The evidence also distinguishes between addressing unlawful behaviour and addressing the underlying ecological conflict. Langholm demonstrated that lawful protection of hen harriers and restoration of grouse-moor management could deliver important conservation outcomes, including increases in several breeding waders and hen harriers, while nevertheless failing to restore red grouse to the project's predetermined level for commercially viable driven shooting. Diversionary feeding substantially reduced the number of grouse chicks taken to hen-harrier nests but did not, in combination with the other management undertaken, restore grouse densities sufficiently for driven shooting. The conflict therefore cannot be characterised solely as a problem of compliance with wildlife law.
- 21.6 This distinction is relevant when considering possible interventions. Licensing may provide a regulatory mechanism for setting conditions, monitoring compliance or responding to offending, but

it does not itself alter the lawful predation pressure which gave rise to the original hen-harrier/grouse conflict. The RSPB's own material reflects that distinction: its proposed mechanism for reducing hen-harrier predation on grouse is diversionary feeding, while its case for licensing is directed principally at unlawful killing and wider management standards.

- 21.7 Brood management provides a different form of conflict-mitigation mechanism because it can reduce local nesting density while allowing hen harriers to breed successfully and their young to be returned to the wild. Natural England's final evaluation concluded that the availability of brood management probably contributed to increased nesting on some grouse moors, while recognising uncertainty over the mechanism and continuing illegal killing. It should therefore be assessed alongside diversionary feeding, monitoring, engagement and enforcement as a potential means of addressing the ecological conflict as well as the conservation objective, rather than assuming that a regulatory mechanism alone resolves both problems.
- 21.8 High standards can therefore reduce risk where they establish unequivocal expectations of lawful conduct, ensure practitioner competence and management accountability, facilitate monitoring and reporting, support cooperation with regulators and police, and provide mechanisms for intervention where poor practice or offending is identified. Their effectiveness should be evaluated against transparent evidence rather than inferred simply from the existence of a written code.

Elements of an effective standard

- 21.9 In the context of grouse moor management, the MA considers that effective high standards should include:
- an unequivocal requirement that all birds of prey and other protected wildlife are treated in accordance with the law;
 - clear expectations from owners, employers and managers that wildlife crime will not be tolerated;
 - appropriate training so that gamekeepers and other staff understand the legal framework governing protected species and lawful predator management;
 - clear separation between lawful predator control and any activity involving protected species;
 - effective supervision and management accountability;
 - procedures for reporting suspected wildlife crime or relevant incidents;
 - cooperation with the police and statutory authorities where an incident requires investigation;
 - appropriate monitoring and record keeping; and
 - consequences where individuals fail to meet required standards.

The police operational framework

- 21.10 These elements are also reflected in the police's own operational framework for tackling bird-of-prey crime. The NWCUC Bird of Prey Crime 4P Plan identifies responsibilities including prompt reporting and sharing of intelligence, proactive identification of problems, collaborative development of solutions, intelligence and crime-data sharing, use of Police crime-recording standards when seeking official comment, promotion of best practice, advice and guidance, and targeted early intervention with individuals considered at high risk of offending. The Wildlife Crime Tactical

Delivery Group Terms of Reference similarly identify prevention, detection, reduction and disruption of wildlife crime, sharing of best practice, confidence-building, training and collaborative working as core objectives (NWCU/NPCC, Bird of Prey Crime 4P Plan and Wildlife Crime Tactical Delivery Group Terms of Reference).

- 21.11 These documents do not demonstrate that any one of those interventions has itself caused a measured reduction in bird-of-prey crime. They do, however, provide official policing support for the proposition that effective prevention depends upon a combination of clear standards, training, accurate reporting, intelligence-sharing, collaboration, targeted intervention and continuing review rather than upon enforcement alone.

Demonstrating compliance and earned recognition

- 21.12 The MA believes there is an important distinction between setting standards and demonstrating that those standards are actually being maintained. A written code is only one component of effective prevention: its value depends on implementation, management accountability, monitoring and appropriate enforcement. Standards are likely to be more credible where compliance can be evidenced through management systems, records, monitoring or other forms of independent scrutiny.
- 21.13 For that reason, the MA supports the broader principle of earned recognition. Where an estate or land manager can demonstrate consistently high environmental and legal standards, that performance should be capable of recognition within the regulatory system. Conversely, where there is robust evidence of non-compliance, regulatory and enforcement attention should be directed towards the activity and individuals concerned.
- 21.14 A proportionate regulatory approach should distinguish demonstrably compliant, high-performing operators from circumstances in which robust evidence identifies elevated risk or non-compliance. Treating both as presenting the same regulatory risk would disregard relevant evidence of performance and weaken the incentive for continued improvement.
- 21.15 There is an important distinction between maintaining zero tolerance of bird-of-prey crime and assuming that any regulatory system can guarantee that no individual will ever offend. The elimination of such crime should remain the objective. Regulation can reduce opportunities for offending, strengthen accountability, improve detection and increase the likelihood of effective sanction, but the continued occurrence of an incident does not, by itself, demonstrate that the only rational response is progressively greater restriction of an otherwise lawful activity.
- 21.16 If the success test for regulation is the complete absence of any future offence, the regime may have no attainable or stable endpoint. Each subsequent incident could be treated as proof that existing controls have failed and as justification for further restriction, irrespective of wider trends, the performance of compliant operators or whether the additional measure would address the particular cause of offending. That would create a regulatory ratchet rather than an objective assessment of effectiveness.
- 21.17 An outright prohibition would remove lawful grouse shooting, but it would not itself guarantee that protected birds would never be killed unlawfully. It could also remove or diminish environmental, economic and social benefits supported by lawful grouse-moor management. The relevant policy question is therefore which proportionate combination of standards, monitoring, enforcement, incentives and targeted intervention is most likely to reduce offending while retaining demonstrable benefits and directing regulatory attention towards identified risks and non-compliance. This is not

an argument for tolerating any level of wildlife crime; it is an argument for assessing regulatory effectiveness against realistic, transparent and evidence-led measures.

Measuring performance against reliable evidence

- 21.18 Assessing whether standards are reducing risk requires a consistent baseline and more than one measure of performance. Confirmed offences, suspected incidents, unexplained satellite-tag disappearances and intelligence should remain separately identifiable because they represent different evidential categories. At the same time, demographic measures can provide an additional and scientifically relevant line of evidence. Ewing et al. (2023), for example, estimated survival and the demographic effect of illegal killing from satellite-tag data, while Macgregor et al. (2025) used productivity, survival and settlement to test competing explanations for the subsequent increase in the English breeding population.
- 21.19 These demographic measures are not substitutes for crime data. Improved survival or increasing breeding numbers do not prove that offences have ceased, while a recorded offence does not by itself establish the trajectory of the population as a whole. Used together, however, confirmed-crime data, satellite-tag survival, breeding attempts, productivity and settlement can provide a more informative assessment of whether conservation risk is changing than any one indicator in isolation. Macgregor et al. explicitly concluded that the population increase required improvement in survival, settlement or both, while also concluding that their modelling could not determine whether illegal killing had in fact reduced. That distinction should be preserved in future monitoring.
- 21.20 The authoritative, regularly updated public evidence base proposed in response to Question 20 would therefore serve two purposes: establishing the scale and evidential status of reported bird-of-prey crime, and providing a consistent baseline against which the effectiveness of particular standards and interventions can be evaluated. Where possible, that assessment should combine transparent crime classifications with relevant population and survival evidence rather than collapsing different forms of evidence into a single measure.
- 21.21 The MA would therefore support Defra working with practitioners, Natural England, policing bodies and other relevant organisations to identify standards capable of reducing the risk of bird-of-prey crime, establish transparent means of monitoring their effectiveness and adapt them in response to evidence. The objective should remain the elimination of bird-of-prey crime, with effective standards recognised and regulatory or enforcement attention targeted where evidence demonstrates elevated risk or non-compliance.

Question 25: What evidence exists on the number of birds shot and how many enter the food chain?

- 25.1 The Moorland Association's response to this question relates only to red grouse.
- 25.2 Red grouse differ fundamentally from the released gamebirds considered elsewhere in this Call for Evidence. They are wild birds which live and breed naturally on the moor and are not bred, reared or released for shooting.

Population monitoring and sustainable harvest

- 25.3 As a wild population, red grouse numbers fluctuate considerably between years as a result of factors including breeding success, weather, disease, predation and habitat conditions. There is therefore no fixed annual number of grouse available for shooting, and the number harvested can vary substantially between seasons and between individual moors. GWCT notes that where populations

fall to levels at which further shooting could jeopardise the breeding stock required for recovery, estates may restrict their shooting programme or cancel shooting altogether.

- 25.4 An important feature of responsible grouse management is consequently the monitoring of the wild population before decisions are made about shooting. Grouse counts are conventionally undertaken in spring and again after breeding in summer. Spring counts provide information on the pre-breeding population, while summer counts measure post-breeding density and breeding success by recording adults and young. GWCT has used standardised spring and summer counts across the uplands for decades.
- 25.5 The July/early-August count is particularly important in determining whether shooting should take place. The number of adults and young, breeding productivity and the stage of the population cycle can be used to estimate the harvestable or “shootable” surplus which can be taken while retaining an appropriate breeding population. That assessment informs both the number of shooting days and, in poor years, whether any shooting should take place at all.
- 25.6 That approach is consistent with international conservation guidance on the sustainable harvesting of wild gamebirds. The IUCN Species Survival Commission’s gamebird conservation guidance emphasises that sustainable harvesting should be accompanied by population monitoring so that the effects of harvest can be assessed and appropriate levels determined. It recognises that harvest need not necessarily result in long-term population decline where populations can compensate for losses, but stresses that sustainability should be established through monitoring rather than assumed (IUCN SSC/WPA/BirdLife, *Partridges, Quails, Francolins, Snowcocks, Guineafowl and Turkeys: Status Survey and Conservation Action Plan*, 2000).
- 25.7 More directly, the IUCN SSC Grouse Specialist Group’s conservation action plan expressly identifies the British red grouse as the subspecies *Lagopus lagopus scoticus*, records the long-established management of its British heather-moorland habitat for sporting harvest, and recommends population monitoring to ensure the sustainability of exploitation where hunting pressure may be high (IUCN SSC/WPA/BirdLife Grouse Specialist Group, *Grouse: Status Survey and Conservation Action Plan 2006-2010*, 2007). The Action Plan is historical and should not be relied upon as evidence of current population status or present-day harvest levels, but its management principle remains directly relevant: sustainable harvest of a wild grouse population should be linked to population monitoring and adjusted according to the condition of that population.
- 25.8 This means that the number of grouse shot in any particular year should not be interpreted in the same way as the number of reared gamebirds released and subsequently shot. In the red grouse system, the population determines the harvest rather than the intended harvest determining the number of birds produced.

Available bag and food-chain data

- 25.9 The MA does not currently hold a sufficiently robust national dataset from which to provide Defra with a definitive annual figure for the number of red grouse shot in England or the proportion entering the human food chain.
- 25.10 Available evidence on grouse bags is collected principally through voluntary recording, including the Game & Wildlife Conservation Trust’s National Gamebag Census and records held by individual shoots and estates. These sources are valuable, but their coverage and methodology should be made clear when they are used to estimate total national harvest.

- 25.11 Shot red grouse are a recognised food resource. Birds may be retained for private consumption, distributed locally or enter the commercial food chain through game dealers and other outlets. However, the MA does not currently hold sufficiently robust evidence to quantify the proportion passing through each route and does not wish to provide an unsupported estimate.
- 25.12 If Defra considers more precise information necessary for future policy, the MA would support proportionate evidence-gathering with grouse moor managers, shoots, game dealers and relevant sector bodies, using clear definitions and a methodology capable of distinguishing between the number of birds shot, birds retained privately, birds entering commercial supply chains and any birds not entering the food chain.
- 25.13 The MA would also encourage Defra to make use of existing voluntary datasets and established grouse-counting systems wherever possible rather than assuming that the absence of a compulsory national bag return means that reliable information on population size, productivity or harvest is unavailable.

Question 26: What evidence exists on the impact of birds that enter the food chain?

- 26.1 The Moorland Association's response relates only to red grouse. As explained under Question 25, red grouse are a naturally reproducing wild population and shooting takes place only where monitoring indicates an appropriate harvestable surplus.
- 26.2 Grouse which are shot may be retained for private consumption, given to others or enter commercial supply chains through game dealers, butchers, retailers and the hospitality sector. Harvested grouse suitable for consumption therefore constitute a food resource rather than waste.
- 26.3 The MA does not hold sufficiently robust quantitative evidence to assess the wider impacts of red grouse entering the food chain or the proportion passing through different routes to consumption. If Defra requires further evidence, that work should distinguish wild red grouse from reared and released gamebirds because their production, harvest and supply-chain models are materially different.

Question 27: What evidence exists on waste or disposal issues associated with shot birds?

- 27.1 The Moorland Association's response to this question relates only to red grouse.

Evidence of a systemic waste problem

- 27.2 The MA is not aware of evidence from its membership of a systemic waste or disposal problem associated with shot red grouse. Members have not reported concerns to the Association about significant quantities of otherwise usable grouse being discarded because there is no use or market for them.
- 27.3 This is relevant operational and experiential evidence. Defra's Call for Evidence expressly welcomes well-documented operational and experiential evidence alongside published research and monitoring data. The experience reported to the MA does not indicate that disposal of unwanted red grouse is a material or systemic problem.

Proper utilisation and responsible disposal

- 27.4 There is also an established commercial market for red grouse as food. Birds are supplied through game dealers, butchers, retailers and the hospitality sector, as well as being retained or distributed for private consumption. This provides an established route by which harvested grouse suitable for human consumption are used as food.
- 27.5 The principle that harvested wildlife should be properly utilised is also reflected in European conservation guidance. Principle 7 of the Council of Europe's European Charter on Hunting and Biodiversity is to "ensure that harvest is properly utilised and wastage avoided". Its associated guidance encourages proper handling and processing of harvested wildlife, care of game meat to prevent wastage and contamination, and appropriate hygiene standards (Council of Europe, *European Charter on Hunting and Biodiversity*, 2007, Principle 7).
- 27.6 The relevant evidential distinction is between birds appropriately excluded from the food chain because they are unsuitable for consumption and otherwise usable birds being unnecessarily discarded. The former is part of responsible handling and should not itself be treated as evidence of a waste problem.
- 27.7 The MA does not hold a national quantitative dataset measuring the proportion of harvested grouse entering different routes to consumption or the proportion appropriately excluded. We therefore do not claim that unnecessary waste never occurs. However, the existence of established outlets for shot grouse, together with the absence of reports from MA members of significant quantities of usable birds having no outlet, provides no indication to the MA of a systemic waste or disposal problem.
- 27.8 If evidence is submitted suggesting otherwise, the MA considers that Defra should establish the scale, frequency and circumstances of the alleged problem. In particular, it should distinguish between:
- birds appropriately excluded from the food chain because they are unsuitable for consumption; and
 - otherwise usable birds being unnecessarily discarded because no outlet exists.
- 27.9 Defra should also distinguish clearly between wild red grouse and reared and released gamebirds before drawing conclusions across different forms of gamebird shooting.

Section A: Call for Evidence Questions - Other impacts

Question 28: What evidence exists of links between gamebird activities and:

- a. use of lead shot;**
- b. misuse of medicated products;**
- c. antimicrobial resistance;**
- d. misuse of pesticides;**
- e. other environmental or social impacts.**

Respondents should address only those topics for which they have evidence.

- 28.1 The Moorland Association's response relates principally to red grouse shooting and associated upland land management. Red grouse are wild birds managed in situ and are not bred, reared and released for shooting, a distinction recognised within Defra's Call for Evidence.

28(a) Use of lead shot

- 28.2 The MA does not seek to duplicate specialist evidence on the use of lead ammunition which is better provided by organisations with detailed technical evidence in this area. We therefore do not provide a substantive response under this heading.

28(b) Misuse of medicated products

- 28.3 Medicated grit is relevant to the management of wild red grouse. It is used to control *Trichostrongylus tenuis*, a parasitic strongyle worm which, at high burdens, can reduce grouse survival and breeding success.

- 28.4 It is important to distinguish the lawful and appropriate use of a veterinary medicine from its misuse. The existence or use of medicated grit should not itself be regarded as evidence of misuse.

- 28.5 Current best-practice guidance requires its use to be targeted according to evidence of parasite burden and local circumstances. Medicated grit containing flubendazole is available under veterinary prescription, with evidence of strongyle burdens required before it is prescribed. GWCT guidance recommends monitoring worm burdens, avoiding unnecessary treatment and maintaining comprehensive records of its use. ([Game & Wildlife Conservation Trust](#))

- 28.6 The guidance also requires medicated grit to be withdrawn at least 28 days before shooting so that the drug does not enter the human food chain. Old medicated grit should be removed from the moor and appropriately disposed of, while grit trays should be positioned and managed to minimise contamination, including avoiding proximity to watercourses. ([Game & Wildlife Conservation Trust](#))

- 28.7 Avoiding unnecessary use is also important because excessive exposure can increase the risk of anthelmintic resistance developing in strongyle worms, potentially reducing the future effectiveness of the treatment. GWCT therefore recommends targeted rather than routine treatment and continued parasite monitoring. ([Game & Wildlife Conservation Trust](#))

- 28.8 The MA does not hold evidence indicating that misuse of medicated grit is a systemic problem amongst its members. However, that should not be taken to mean that environmental questions require no further investigation.

- 28.9 A 2025 rapid evidence assessment by GWCT identified important gaps in the evidence concerning the environmental fate of flubendazole on UK grouse moors. Its initial search found no studies directly examining environmental impacts under UK upland grouse-moor conditions. After widening the evidence base, the review found little or no toxic effect in terrestrial environments but evidence of potential effects in aquatic environments. It concluded that current best practice should substantially minimise those risks if consistently followed, while recommending further field research into concentrations of flubendazole and its metabolites in upland water, grouse faeces and moorland vegetation. ([Game & Wildlife Conservation Trust](#))

- 28.10 The MA therefore supports evidence-led, targeted use of medicated grit, veterinary oversight, adherence to withdrawal and environmental safeguards, and further research where genuine

evidence gaps remain. Where new evidence identifies improvements to existing practice, guidance should be updated accordingly.

28(c) Antimicrobial resistance

- 28.11 The MA has identified one recent peer-reviewed study directly concerning antimicrobial-resistance pathways in red grouse microbiota. Ahmad et al. (2025) used metagenomic sequencing of caecal samples from 15 red grouse shot on three managed Scottish moorland estates and identified microbial functions including antimicrobial-resistance pathways. The study is the first modern metagenomic characterisation of the red grouse gut microbiome and demonstrates considerable previously undescribed microbial diversity (Ahmad et al., 2025).
- 28.12 The study does not, however, examine antimicrobial use, compare birds from managed and unmanaged moorland, identify management practices responsible for the detected pathways or establish any causal relationship between grouse shooting and antimicrobial resistance. It therefore provides evidence that AMR-related genetic pathways occur within the natural microbiota of sampled red grouse, but not evidence that gamebird management has caused or increased antimicrobial resistance.
- 28.13 For clarity, the potential development of resistance by strongyle worms to flubendazole referred to under 28(b) is anthelmintic resistance rather than antimicrobial resistance and should not be conflated with this question. On the evidence presently available to the MA, no sector-wide conclusion about a link between red-grouse management and antimicrobial resistance can properly be drawn.

28(d) Misuse of pesticides

- 28.14 The MA does not hold evidence which would enable it to provide a substantive sector-wide assessment of misuse of pesticides and therefore does not seek to make claims beyond its evidence.

28(e) Other environmental or social impacts

- 28.15 One important environmental and social impact which the MA considers should form part of Defra's assessment is the relationship between active upland land management, vegetation fuel and wildfire risk and resilience.

Wildfire risk and environmental consequences

- 28.16 Wildfire can itself cause significant environmental and social harm, including damage to peat and vegetation, wildlife and designated features, as well as risks to carbon stores, water quality, infrastructure, neighbouring communities and public safety. Any assessment of future upland management therefore needs to consider not only the effects of management interventions under normal conditions, but also their consequences for wildfire behaviour and the ability to prevent and respond to fires.

Observed wildfire outcomes: Lees et al. (2026)

- 28.17 Recent peer-reviewed research by Lees et al. (2026), based on a database of 206 wildfires in England and Wales, provides unusually direct evidence because it examines observed wildfire size and severity rather than relying solely on proxies such as vegetation condition or fuel load. The study found significant differences in wildfire characteristics according to vegetation type. Molinia-dominated landscapes experienced larger fires, while higher heather cover was associated with greater fire severity.

- 28.18 Importantly, the study also examined associations between management and wildfire outcomes. Fires occurring in areas managed by burning were significantly smaller than fires in areas with no management, although there was no significant difference in fire severity. The authors describe this as partial support for the proposition that managed burning can reduce wildfire spread by reducing fuel loads and creating firebreaks. Cutting may have similar effects, but there were too few wildfires in cut areas for the study to test this robustly.
- 28.19 The same study did not find evidence that restoration reduced wildfire size or severity. That finding should itself be treated cautiously: only five sites with visible restoration management could be identified, restoration is often targeted at already degraded or fire-prone locations, and the authors identify limitations in the available management data and potential confounding between vegetation type and management. The appropriate conclusion is therefore not that restoration is ineffective, but that claims about wildfire outcomes should reflect what has actually been measured and the limitations of the evidence.
- 28.20 The study is particularly relevant to the present Call for Evidence because it demonstrates that vegetation type and management matter and that there is unlikely to be a single appropriate approach to wildfire resilience across all upland landscapes. Lees et al. conclude that management should respond to the characteristics of particular vegetation communities, including the distinctive risks associated with *Molinia*, heather and mixed moorland vegetation.

Site-specific vegetation and fuel management

- 28.21 The need for a differentiated approach is supported by a growing body of UK peer-reviewed research. Davies et al. (2016), examining British moorland wildfires, found that burn severity varied substantially within individual fires according to vegetation structure and fire weather, while surface-fuel consumption increased approximately linearly with the amount of fuel present before the fire. Estimated carbon release ranged from approximately 0.36 to 1.00 kg C m⁻². The authors identified drier moorland vegetation types as particularly vulnerable to severe burning and suggested that differences in moss and litter flammability may help explain why wildfire can consume substantially more carbon than prescribed fire. The number of wildfires examined was limited and the study did not test whether any particular management intervention reduced wildfire occurrence or extent (Davies et al., 2016).
- 28.22 More recent field measurements reinforce the importance of fuel condition. Lewis et al. (2024) measured live heather, dead heather and moss/litter moisture on blanket peat in the North York Moors and found substantial variation both seasonally and within individual days. Moisture in moss and litter could move above and below estimated ignition thresholds within a single day, while ignited moss and litter could add materially to the amount of available fuel. The study was undertaken on one managed estate and did not compare managed and unmanaged ground, so it does not establish the effect of prescribed burning. Its relevance is that fuel moisture and structure vary dynamically and need to be considered directly when assessing wildfire risk rather than inferred from vegetation classification alone (Lewis et al., 2024).
- 28.23 Minsavage-Davis et al. (2024) provide a wider northern-European assessment based on 296 fuel samples from heathland and blanket-mire vegetation in England, Scotland and Norway. Their generalised fuel models predicted the highest rates of fire spread in mature and tall building-stage heather, with substantially lower predicted spread in blanket-bog communities. Moss and litter could constitute a large proportion of the total fuel load and substantially increase predicted fire spread when dry. The modelling indicates that unmanaged mature *Calluna* can constitute a greater wildfire hazard and identifies vegetation management and, over longer timescales, restoration of wetter

conditions as potentially relevant risk-reduction measures. Fire behaviour was modelled rather than measured in landscape-scale wildfires, although the models were evaluated against experimental burns (Minsavage-Davis et al., 2024).

- 28.24 The significance of fuel moisture under extreme weather is demonstrated further by Ivison et al. (2025). Across 43 peatland, heathland and acid-grassland sites in Great Britain, the authors collected 5,845 fuel-moisture samples during 2021-2023. During the July 2022 heatwave, normally different moisture controls affecting live heather, dead heather and the organic surface layer became aligned: dead-heather moisture fell exceptionally low and the organic layer reached its driest measured condition. Fire-behaviour modelling predicted substantially faster spread, longer flames and greatly increased ignition probability under those conditions. The study did not test burning, cutting or another particular management intervention; its direct implication is that extreme weather can create conditions in which above-ground fuel becomes an increasingly important determinant of fire behaviour and suppression difficulty (Ivison et al., 2025).
- 28.25 Independent Scottish landscape evidence is also relevant. Fielding et al. (2024), in a Scottish Government-funded analysis covering approximately 39,000 km² of moorland, found limited spatial overlap between mapped prescribed burning and wildfire: prescribed burning was mapped across 13.1% of moorland, wildfire across 1.1%, and 96% of mapped wildfire area occurred outside moorland identified as managed by prescribed burning. However, the authors expressly state that their analysis provides no mechanistic evidence that prescribed burning itself caused the lower wildfire occurrence. Wildfire incidence was not progressively lower with increasing burning intensity, and the authors identify other plausible explanations including grazing, wildfire-prevention strategies, firebreaks, trained personnel and equipment, and differences in recreational ignition pressure. They also recognise the risk of prescribed fires escaping. This is therefore evidence of an association between wider management systems and wildfire occurrence, not proof that greater burning necessarily reduces wildfire risk (Fielding et al., 2024).
- 28.26 International evidence provides supporting but less directly transferable evidence that fuel treatment can alter subsequent wildfire behaviour. Collins et al. (2023), studying extreme fires in south-eastern Australia, found that recent fuel-reduction burning reduced fire occurrence and severity, although the effect declined with time and extreme fire weather became increasingly dominant. Jones et al. (2025), examining the 2022 Black Fire in New Mexico, likewise found substantially less high-severity fire in previously treated areas. These studies concern forest and shrubland systems very different from British blanket bog and should not be used quantitatively to predict outcomes on English moorland. Their narrower relevance is that experimental and observational evidence from other fire-prone systems supports the general mechanism by which prior fuel treatment can moderate subsequent wildfire behaviour (Collins et al., 2023; Jones et al., 2025).
- 28.27 That wider evidence is consistent with the Scottish Government's Grouse Moor Management Review Group, which recognised that prescribed burning can operate in two directions: poorly controlled burning can itself initiate wildfire, while well-managed burning may reduce accumulated fuel and create firebreaks. Cutting and grazing can also reduce fuel, while the appropriate combination of interventions remains site-specific (Grouse Moor Management Review Group, 2019).
- 28.28 Defra should therefore assess different land-management approaches against the quantity, structure, continuity and moisture of combustible vegetation; hydrological condition; the effectiveness of firebreaks; access and water availability; surveillance and early detection; availability of trained personnel and appropriate equipment; and observed wildfire outcomes. The relevant policy question is not whether one technique should be used universally, but which combination of hydrological

restoration, vegetation management, grazing, ignition prevention and response capacity produces the best evidenced environmental outcome at the particular site.

Hydrology and surface-fuel management

- 28.29 It is particularly important in that assessment to distinguish between different components of wildfire risk. Restoring hydrology can materially reduce the vulnerability of peat to deep combustion and prolonged smouldering. Surface-fire behaviour, however, is also influenced by the quantity, structure, continuity and moisture content of above-ground vegetation. Rewetting and surface-fuel management therefore address different parts of the wildfire-risk chain and should not automatically be treated as alternatives. Depending on the site, effective resilience may require a combination of hydrological restoration, vegetation management, ignition prevention, access, surveillance and emergency-response capability. This integrated approach is consistent with the wider evidence considered by the MA.
- 28.30 Recent operational evidence from the 2025 Fylingdales Moor wildfire illustrates the practical relevance of surface-fuel continuity to wildfire containment. The North Yorkshire Local Resilience Forum records that, on the advice of Wildfire Tactical Advisors, operational commanders adopted a hybrid firebreak approach involving surface-fuel separation to reduce the risk of surface-fire spread. It also records that sections adjoining an existing fire track were cut to maximise the distance between fuels. The fire subsequently breached that firebreak, demonstrating the limits of such measures under severe conditions. This evidence does not establish that any particular preventative vegetation-management regime would have prevented the incident, but it does confirm that surface-fuel continuity and separation are operationally material considerations in wildfire response and containment (North Yorkshire Local Resilience Forum, 2026).
- 28.31 The achievable hydrological response may itself differ materially between peatland settings. Ecohydrological work commissioned by the Environment Agency identifies important differences in water inputs, landscape position, slope, underlying geology and the capacity of individual peatlands to retain water. These characteristics influence achievable water-table conditions, vegetation and ecological function. Defra should therefore avoid assuming that the same restoration intervention will produce an equivalent hydrological, vegetation or wildfire-resilience outcome on all blanket-bog sites (Wheeler et al., 2023).

Operational evidence from conservation management

- 28.32 There is also relevant operational evidence from conservation-led upland management outside grouse moors. At Lake Vyrnwy, the RSPB and Hafren Dyfrdwy have combined large-scale peatland restoration with active management of above-ground vegetation. Denny (2025) records that both organisations are conscious of wildfire risk; that heather has been mown to reduce potential fuel load as well as to create different vegetation heights; and that rewetting, mowing and managed grazing are all expected to contribute to reducing fire risk. Hafren Dyfrdwy is also leading work to identify wildfire risk across the area.
- 28.33 This should not be treated as evidence that those measures have yet produced a quantified reduction in wildfire size, severity or probability at Lake Vyrnwy. The report provides operational case-study evidence rather than a controlled assessment of wildfire outcomes. Its relevance is narrower: it demonstrates that, in a large conservation-managed upland landscape undergoing peatland restoration, rewetting is not being treated as a complete substitute for management of surface vegetation and fuel. Hydrological restoration, mowing and grazing are instead being used as potentially complementary elements of wildfire-risk management.
- 28.34 That practical approach is consistent with the MA's wider argument that Defra should assess the different components of wildfire risk separately. Measures which increase peat moisture may reduce

vulnerability to deep combustion, while management of above-ground vegetation may influence fuel continuity and fire spread. The appropriate question is therefore which combination of interventions produces the best evidenced wildfire-resilience outcome at a particular site, rather than whether one management technique should automatically displace another.

Peatland restoration on grouse moors

- 28.35 There is also practical evidence that grouse-moor management and peatland restoration are not mutually exclusive. GWCT's 2022 audit records that grouse moors had blocked approximately 7,000 km of historic drainage channels to re-wet peatland and had restored or re-vegetated more than 27,000 hectares of peatland over the preceding two decades. Those cumulative figures drew on Moorland Association member reporting, including more recent restoration and drain-blocking activity alongside work undertaken in earlier years.
- 28.36 These figures should be treated as member-reported evidence rather than as an independently audited national inventory, and they do not by themselves demonstrate the environmental outcome achieved on every hectare restored. Their relevance is narrower but important: substantial peatland restoration has taken place within a land-management system that also supports grouse shooting. Defra should therefore avoid treating "grouse-moor management" and "peatland restoration" as necessarily competing land uses. The appropriate question is how restoration, vegetation management, grazing and wildfire-risk management can be combined to deliver the best evidenced outcomes at individual sites.

Wildfire, carbon and whole-system assessment

- 28.37 The consequences of severe wildfire need to be included in any environmental and carbon assessment of upland management. Research on the 2025 Dava Moor fire found above-ground fuel load substantially above the recent average and concluded that fuel accumulation probably contributed to rapid fire spread while exceptionally dry climatic conditions primed the system to burn. Approximately 84% of the estimated carbon emitted by that fire came from peat. This does not identify which management regime would have prevented the fire, but it demonstrates that fuel, drought and peat combustion can interact to generate carbon losses on a scale very different from routine vegetation-management emissions.
- 28.38 National peer-reviewed modelling supports the significance of that risk. Baker et al. (2025) estimated that UK wildfires burning peat emitted approximately 776 kt of carbon between 2001 and 2021, with emissions strongly concentrated in dry years; the modelling attributed approximately 24 kt of carbon to the Saddleworth Moor fire alone. The estimates depend upon assumptions concerning peat bulk density, soil moisture and burn depth, and subsequent field evidence has demonstrated that those assumptions can overestimate losses at particular sites. The study also does not identify which management intervention would reduce emissions. Its relevance is the national-scale evidence that peatland wildfire is a material and episodic component of the UK carbon balance (Baker et al., 2025).
- 28.39 Emerging field evidence also bears directly on the potential effect of vegetation management during severe wildfire. A 2026 preprint arising from the NERC-funded IDEAL UK FIRE programme examined the 1,239-ha Langdale Moor wildfire in the North York Moors and estimated approximately 25 kt of soil-carbon loss. Recently managed vegetation patches, most of which had previously been prescribed burned, were reported to be predominantly unburned or of low severity, with no high-severity burning recorded within those patches; the authors estimated that recent vegetation management avoided almost 7 kt of soil-carbon loss (Baker, Franz Bodenham, Little, Doerr et al., 2026).

- 28.40 That result should presently be treated as supplementary rather than determinative evidence. It is a preprint and has not yet completed peer review; it concerns one wildfire; management history and timing were partly reconstructed from remotely sensed data; site access was restricted; and carbon density was modelled rather than comprehensively measured by coring. It does not demonstrate that vegetation management prevents wildfire. It does, however, provide an important testable indication that recent fuel management may alter wildfire severity and resulting peat-carbon loss under severe English moorland fire conditions.
- 28.41 Where peatland restoration or changes in upland management are justified partly on carbon grounds, Defra should therefore assess the complete carbon system. That should include routine management emissions and sequestration, vegetation and peat recovery, greenhouse-gas fluxes and the probability and consequences of episodic wildfire loss. The relevant comparison is not between a management intervention with measurable routine emissions and an alternative assumed to have no fire-related carbon cost, but between the expected whole-system carbon outcomes of realistic alternative management regimes.

Carbon stocks, fluxes and time horizons

- 28.42 The same whole-system approach is required when assessing peatland carbon itself. Carbon stock and carbon flux are different measures, and the environmental effect attributed to a management intervention can depend materially on the period over which it is measured. GWCT's 2020 *Peatland Report*, drawing on the peer-reviewed literature available at that time, noted that much of the evidence on carbon fluxes from managed upland peat came from a relatively small number of sites and short-duration studies. Measurements made in the year of a vegetation-management intervention, or shortly afterwards, may therefore capture an immediate carbon loss without necessarily capturing subsequent vegetation recovery or other carbon pathways over the full management cycle. The same caution applies to the interpretation of visible peat erosion. Fenton (2022), using Antarctic moss peat as a simplified system through which to examine wider peatland processes, reports that peat growth can cease and surface erosion can develop in the absence of anthropogenic influence. This does not establish that erosion on English blanket bog is generally natural, benign or unrelated to land management. Its relevance is methodological: the observation of erosion should not, without additional evidence of causation, be treated as proof of anthropogenic damage or attributed automatically to a particular management practice.
- 28.43 The underlying primary evidence includes the long-term experiment reported by Marrs et al. (2019). Using peat cores from replicated experimental plots subject to different burning frequencies since approximately 1923, the authors found that peat and carbon accumulation continued under both burned and unburned treatments. Accumulation was significantly reduced only in the most frequently burned treatment, although the results also indicated that each additional burn progressively reduced accumulation rates. The study further recorded increases in species diversity and the abundance of some peat-forming species with burning frequency.
- 28.44 These findings provide direct evidence that prescribed burning did not prevent peat formation or carbon accumulation at that experimental site. They do not demonstrate that burning necessarily improves the carbon balance of peatland, that frequent burning carries no carbon cost, or that the findings can be applied without qualification to every upland peatland.
- 28.45 More recent primary research provides evidence about one specific mechanism by which prescribed burning may affect peatland carbon: direct heating of the underlying soil. Baker et al. (2026) measured soil temperatures, above-ground temperatures and fire severity during eight prescribed

burns undertaken across the UK by trained teams operating under current prescribed-burning guidance. Across the burns studied, both organic-rich peaty soils and mineral soils experienced little heating; mean maximum soil temperatures were below 43.4°C and the fire-severity assessments recorded no below-ground organic-matter loss. The authors concluded that, under the conditions studied, prescribed burns undertaken in accordance with current training and guidance did not expose the underlying soils to temperatures likely directly to damage long-term carbon stores (Baker et al., 2026).

- 28.46 These findings should not be interpreted as demonstrating that prescribed burning has no carbon or ecological effects, or that the same result would occur under all sites, weather conditions or burning practices. The study examined eight burns conducted under relatively mild conditions and assessed direct soil heating rather than the complete carbon balance over a management cycle. Its relevance is therefore specific but important: evidence concerning the effects of uncontrolled wildfire or poorly conducted fire should not automatically be treated as evidence of the direct soil-heating effects of a properly planned prescribed burn.
- 28.47 Other primary research demonstrates why environmental assessment needs to extend beyond the immediate heating effect of an individual burn. Whitehead & Baines (2018) and Whitehead, Weald & Baines (2021) examined post-burning vegetation responses on blanket peat. The latter found higher Sphagnum cover on plots eight to ten years after burning than on unburned controls, higher cotton-grass cover across burned plots and no overall reduction in plant or moss diversity across the burn-age sequence. These were observational studies at particular sites and do not demonstrate that burning is appropriate or beneficial on all blanket bogs; they do show that long-term vegetation response cannot be inferred simply from the immediate removal of above-ground vegetation (Whitehead & Baines, 2018; Whitehead, Weald & Baines, 2021).
- 28.48 Alternative management techniques also have measurable effects. Heinemeyer, Berry & Sloan (2019) compared cutting and burning on English blanket bog and found no lasting plot-scale effect of tracked cutting machinery on peat depth or bulk density, while identifying changes to microtopography and potential site-specific effects associated with machinery. Heinemeyer et al. (2025a) subsequently reported, from a ten-year replicated experiment on three northern English blanket-bog grouse moors, that burning, cutting and non-management produced different effects on heather nutrient composition, with most treatment differences reducing as vegetation recovered. These studies do not establish that burning is superior to cutting; they demonstrate that management alternatives have different ecological consequences and should be compared on equivalent outcomes rather than assuming that one constitutes a no-impact control.
- 28.49 International experimental evidence further illustrates the sensitivity of peatland greenhouse-gas and carbon responses to site context. Cui et al. (2025), in a 90-day laboratory experiment using degraded Danish organic soils, found that controlled surface burning before rewetting greatly reduced the short-term methane pulse associated with rewetting, but expressly cautioned that field trials were required before the approach could be recommended. Ji et al. (2025), in a three-year experiment on a permafrost-influenced peatland in north-east China, recorded greater soil organic carbon following low-intensity prescribed burning. Neither system is directly comparable with British blanket bog, and neither study should be used to advocate equivalent treatment in England. Their relevance is narrower: peatland carbon responses to fire, rewetting and vegetation recovery are strongly context-dependent and should not be represented by a universal direction of effect (Cui et al., 2025; Ji et al., 2025).

- 28.50 The interpretation and wider applicability of the study were subsequently challenged by Baird et al. (2019). They argued that the experiment had been conducted on a degraded, gullied and unusually Calluna-dominated site and that its findings should not be extrapolated to natural or rewetted peatlands more generally. Marrs et al. responded in defence of the relevance and interpretation of the experiment. That published exchange is itself important evidence: the measurements made at the experimental site are not necessarily disputed, but their interpretation and transferability to other peatland conditions remain contested.
- 28.51 The wider literature also identifies pyrogenic carbon (charcoal produced by incomplete combustion) as a potentially long-lived component of peat carbon storage which has not been treated consistently in carbon assessments. That possibility does not establish that burning produces a net carbon benefit, but it reinforces the need for comparisons to use a complete and consistent carbon account.
- 28.52 Defra should therefore distinguish between what the individual studies measured, the conclusions which can properly be drawn at the study site and the wider policy conclusions subsequently advanced by different authors. Comparisons between burning, cutting, grazing, rewetting and non-intervention should use comparable time horizons and account, so far as the evidence permits, for peat accumulation, vegetation recovery, greenhouse-gas fluxes, dissolved and particulate carbon, pyrogenic carbon and the risk of episodic loss through severe wildfire.

Fylingdales Moor: the consequences of severe wildfire

- 28.53 An English example illustrates the potential scale of those consequences. The North Yorkshire Local Resilience Forum's report into the 2025 Fylingdales Moor fire records that, at its height, the fire extended across approximately 20 square kilometres and posed an active risk to RAF Fylingdales, part of the UK's critical national-security infrastructure. Initial analysis by the University of Exeter estimated emissions from the direct combustion of peat soil at 54,258 tonnes CO₂e. The incident began in June and the fire was not formally closed until December.
- 28.54 This example does not establish what particular management intervention, if any, would have prevented the fire, and it should not be used to infer such a causal conclusion. It does, however, demonstrate the scale of the environmental, operational and public-safety consequences that can arise from severe upland wildfire. Those consequences form part of the relevant counterfactual when assessing policies which may affect vegetation condition, fuel accumulation, access, prevention and wildfire-response capability.
- 28.55 Wildfire also has social and health consequences extending beyond the vegetation and carbon directly affected by the fire. Peer-reviewed international evidence demonstrates that wildfire-smoke exposure is associated with measurable respiratory and cardiovascular harm. Barros et al. (2025), using paired biomonitoring samples from wildland firefighters in Portugal, recorded post-exposure increases in biomarkers associated with lung injury, oxidative stress and exposure to combustion products. The study involved only 23 firefighters and the vegetation and operational context differ from the UK, but it provides direct physiological evidence of occupational exposure during wildfire suppression (Barros et al., 2025).
- 28.56 Population-level epidemiological work similarly identifies health effects from wildfire smoke. Riss et al. (2025), analysing 173,954 emergency and urgent-care visits associated with smoke from 217 fires in Nevada, found associations between PM_{2.5} exposure and acute cardiorespiratory outcomes, with the magnitude and type of response differing according to fire characteristics. Importantly, the paper also cautions against assuming that smoke from low-intensity or managed fire is harmless. These results concern a different ecological and healthcare context and should not be transferred

quantitatively to England, but they establish that smoke is a material externality which should form part of a whole-system assessment (Riss et al., 2025).

- 28.57 The potential geographical reach of those impacts is illustrated by Zhang et al. (2025), whose analysis of the exceptional 2023 Canadian wildfire season found measurable increases in wildfire-derived fine-particle exposure across Europe. The scale and forest-fire context bear little resemblance to an English moorland wildfire and mortality estimates remain sensitive to modelling assumptions. The narrower policy point is nevertheless relevant: the environmental and social costs of severe wildfire can extend well beyond the land burned and should not be excluded from the comparison of management scenarios (Zhang et al., 2025).

Restoration, wildfire and unresolved evidence gaps

- 28.58 Recent discussion of peatland restoration and wildfire resilience illustrates why this evidential distinction matters. Rewetting and restored hydrology can provide important environmental benefits and can reduce vulnerability to deep peat combustion. However, evidence of a raised water table, wetter vegetation or improved water retention should not, without further evidence, automatically be treated as equivalent to measured effects on wildfire ignition, rate of spread, fire intensity, severity or final area burned.
- 28.59 This distinction is also important because restoration is a process rather than an instantaneous change in wildfire behaviour. Existing surface vegetation may remain for a considerable period while hydrological and ecological restoration develops. During that transition, fuel management and other wildfire-prevention measures may continue to be relevant. The evidence reviewed by the MA therefore supports treating peatland restoration and proportionate fuel management as potentially complementary interventions rather than assuming that one necessarily substitutes for the other.
- 28.60 The Government's own Environmental Improvement Plan recognises that further work is required to understand the relationship between restored hydrology and wildfire resilience. That continuing research programme is important because it indicates that material questions remain about how different restoration and vegetation-management approaches perform under wildfire conditions.
- 28.61 The unresolved nature of this question has also previously been recognised by the RSPB. Its 2020 review of the environmental impacts of grouse-moor management identified as key research questions whether prescribed burning increases or reduces wildfire risk, whether controlled managed burning can reduce the spread and impact of wildfire, and what contribution cutting and peatland restoration can make to reducing wildfire spread and impact. It also recognised the proposition that reducing vegetation fuel load may be important in high wildfire-risk areas (Thompson & Wilson, RSPB, 2020).
- 28.62 The significance of that review is not that it resolves which intervention is preferable, but that it records these relationships as unresolved research questions. Subsequent Government and academic research should therefore be understood as addressing an acknowledged evidence gap.
- 28.63 More recent peer-reviewed literature provides a further reason not to treat existing evidence reviews as the final position. Heinemeyer et al. (2025b) concluded that assessment of peatland-management evidence needs to account more explicitly for site-specific and pre-management differences, study design, confounding, temporal and spatial scale and comparison with alternative management regimes; the authors specifically identified Noble et al. (2025; NEER155) among reviews which they considered should be re-examined. That published critique should not itself be treated as resolving the scientific debate or as demonstrating that NEER155 is incorrect. Its relevance is that

material disagreement remains over how parts of the evidence base have been interpreted and synthesised. Defra should therefore consider the underlying studies and subsequent evidence alongside the conclusions of individual reviews rather than treating any one synthesis as determinative (Heinemeyer et al., 2025b).

- 28.64 The evidence base has also continued to develop since NEER155 was published. Whitehead, Aebischer & Baines (2026) report a randomised before-after-control-impact experiment replicated across five blanket-bog sites in northern England. Over the first five years, prescribed burning and mechanical cutting both reduced heather dominance and vegetation height, with increased cover of peat-forming vegetation including Sphagnum and Eriophorum vaginatum; all management treatments reduced fuel loads, while leaving cut brash slowed Sphagnum recovery and was identified as potentially increasing wildfire-ignition risk. The study does not establish the long-term superiority of either burning or cutting, and the authors call for further longer-term research. It does, however, provide new primary evidence which post-dates NEER155 and should form part of any current assessment of the relative effects of vegetation-management options (Whitehead, Aebischer & Baines, 2026).

Current research and statutory scrutiny

- 28.65 Government has itself treated wildfire resilience as an area requiring further evidence. The Third National Adaptation Programme committed Defra to commission wildfire research, including an England wildfire-risk map and work to define “effective wildfire risk reduction measures”, and established a wildfire-risk programme for 2023-27 intended to ensure that land management is adapted to wildfire risk (HM Government, Third National Adaptation Programme, 2023).
- 28.66 The IDEAL UK FIRE research programme similarly identifies “major uncertainties” in the costs and benefits of wildfire-management tools and describes the evidence concerning their ecological and carbon effects as limited and sometimes conflicting. It is testing approaches including prescribed burning, mowing, managed succession and rewetting across different landscapes and timescales, including whether fuel-management interventions reduce wildfire spread at landscape scale and how the long-term carbon effects of repeated intervention compare with severe wildfire (IDEAL UK FIRE, Toward Informed Decisions on Ecologically Adaptive Land Management for Mitigating UK FIRE, Case for Support).
- 28.67 Independent statutory scrutiny points in the same direction. The Office for Environmental Protection’s 2024/25 assessment states that “resilience to wildfires in England is largely unevidenced”, identifies continuing weaknesses in coordination and evidence concerning wildfire adaptation, and recognises a role for peatland restoration in reducing wildfire risk. The appropriate conclusion is therefore not that restoration lacks value, but that no single intervention should be assumed to provide the complete answer to wildfire resilience where the relevant wildfire outcome has not itself been demonstrated (Office for Environmental Protection, Progress in improving the natural environment in England 2024/2025, 2026, pp. 177-181).
- 28.68 This is also consistent with the Government’s wider climate-policy framework. The Environmental Improvement Plan 2025 distinguishes between reducing greenhouse-gas emissions and adapting the natural environment to the effects of climate change. It commits government to measurable and time-bound climate-resilience objectives, improved monitoring and evaluation, and more dynamic management of protected sites in response to changing climate risk. Wildfire resilience should therefore be assessed as an adaptation outcome in its own right, rather than assumed to follow

automatically from a management intervention undertaken principally for carbon or habitat objectives.

- 28.69 Peer-reviewed climate science reinforces the importance of treating wildfire as an adaptation issue. Arnell, Freeman & Gazzard (2021), applying UKCPI8 climate projections to indicators used in the UK Fire Severity Index, projected increases in the frequency of conditions conducive to wildfire across every UK region under future climate scenarios. The study models fire danger rather than actual fire occurrence and does not assess any particular land-management intervention: ignition remains heavily influenced by human behaviour. Its relevance is that the climatic background against which upland-management choices are being made is itself changing, so the effectiveness of present management prescriptions cannot safely be assumed to remain constant (Arnell, Freeman & Gazzard, 2021).
- 28.70 That projected change is consistent with the field measurements of Ivison et al. (2025), which demonstrate how an extreme UK heatwave can simultaneously dry live vegetation, dead vegetation and organic surface fuels to conditions associated with greatly increased ignition probability and modelled fire spread. Together, the projection and field evidence strengthen the case for evaluating management options against future rather than only historic wildfire conditions (Arnell et al., 2021; Ivison et al., 2025).
- 28.71 Defra should therefore distinguish between evidence that a management intervention changes an intermediate condition (such as fuel load or water table) and evidence that it changes the wildfire outcome ultimately relevant to policy, including ignition, spread, intensity, severity or area burned. Where that final relationship has not been measured, the limitation should be stated rather than causation assumed.
- 28.72 An independent peer review of the post-2013 peatland-burning evidence provides a useful framework for dealing with that uncertainty. Stewart's peer-review evidence statement for Ashby (2020) identified substantial difficulties in synthesising studies conducted at different spatial and temporal scales, inconsistency of effects between studies, and risks of confounding and inappropriate causal attribution. It concluded that, alongside precaution on particularly sensitive sites, an adaptive-management framework could address uncertainty by applying different management approaches in appropriate locations, monitoring their outcomes and using the resulting evidence to improve future decisions. This supports a site-specific, monitored approach rather than assuming that one management prescription will produce the same outcome across all peatland settings (Stewart, independent peer-review evidence statement in Ashby, 2020).

The counterfactual and climate-adaptation capacity

- 28.73 This also requires consideration of the counterfactual. If regulation materially changes or reduces the management associated with grouse shooting, Defra should consider what happens not simply to grouse shooting itself but to the vegetation management, grazing, monitoring, firebreaks, infrastructure, equipment, specialist knowledge and year-round practitioner presence currently associated with that land-management system.
- 28.74 That counterfactual should include climate-adaptation capacity as well as direct environmental effects. Tracks, firebreaks, water access, equipment, surveillance and experienced people on the ground can all affect how quickly a wildfire is detected, contained and suppressed. If future regulation materially changes the management system which currently supports those capabilities, Defra should assess what will replace them and whether the alternative provides equivalent or better resilience under hotter, drier and more fire-prone conditions.

- 28.75 The environmental counterfactual extends beyond wildfire. Mason et al. (2025) modelled the combined effects of grouse-moor management change and climate change on red grouse, curlew and golden plover across Great Britain. Their modelling predicted declines in all three species under cessation of grouse-moor management, with larger projected declines when management change was combined with future climate change. However, climate and land cover explained considerably more variation than grouse-moor management for curlew and golden plover, the management relationship was correlative and the authors also identify potential benefits of cessation for controlled predators and raptors affected by illegal killing. The study therefore does not establish that continuation of existing management is environmentally preferable overall. It does demonstrate that the environmental counterfactual to management change contains its own species effects and must be assessed rather than treated as a neutral baseline (Mason et al., 2025).
- 28.76 Defra's assessment should therefore consider simultaneously the likely effects of alternative management scenarios on wildfire resilience, peat and greenhouse-gas outcomes, vegetation structure and species populations. The relevant comparison is between plausible whole management systems under a changing climate, not between the measurable impacts of existing management and an alternative assumed to have no environmental costs or trade-offs.
- 28.77 There is a related social consideration. Grouse-moor management supports a body of practical upland knowledge and skills concerning habitat management, wildlife monitoring, lawful predator management, fire prevention and response, and working safely across difficult and remote terrain. These capabilities have value beyond the act of shooting itself.
- 28.78 The MA does not suggest that grouse shooting automatically produces good wildfire or environmental outcomes, nor that prescribed burning or any other particular technique should be used universally. Where a management practice is demonstrated to create environmental harm, that should be addressed. Equally, where a practice or combination of practices demonstrably improves wildfire resilience or other environmental outcomes, that evidence should form part of the assessment.
- 28.79 This is not merely a theoretical consideration. The official multi-agency debrief of the 2025 Fylingdales Moor wildfire recommends that future wildfire risk assessment should make greater use of local knowledge and input from existing groups such as the North Yorkshire Wildfire Group. It also recommends involving organisations able to provide specialist equipment at short notice in future planning and exercises, and recognises that organisations outside formal Local Resilience Forum structures can contribute valuable capabilities, knowledge and skills during major incidents. This evidence does not demonstrate that such capacity depends uniquely on grouse shooting, but it does confirm that locally retained knowledge, practitioner capability and rapidly deployable equipment are recognised components of effective wildfire preparedness and response. Defra should therefore consider how alternative land-use and regulatory scenarios might affect the continued availability of that capacity (North Yorkshire Local Resilience Forum, 2026).
- 28.80 Recent practitioner evidence provides an indication of the scale of that locally retained capacity in practice. An unpublished operational return supplied to the Moorland Association following the July 2026 Tintwistle wildfire records 48 personnel from participating estates and other contributors providing a total of 2,392 person-hours of wildfire response, alongside the deployment of specialist off-road vehicles and firefighting equipment (Annex 2). This is operational evidence from a single incident rather than a controlled assessment. It quantifies the scale of personnel and practical response capacity that can be mobilised from the managed uplands during a serious wildfire. That

capacity should form part of the counterfactual when assessing policy changes which may affect employment, equipment investment and year-round practitioner presence.

- 28.81 Comparable practitioner evidence from the 2025 Carrbridge and Dava wildfires in Scotland provides further evidence of the scale and nature of this capacity. A targeted survey by Scottish Land & Estates recorded at least 101 employees of responding land-based and rural businesses engaged in containment, of whom 67 had completed approved muirburn training and a further 13 had practical experience of making muirburn: 80 of the 101 therefore had previous experience of using fire in land management. Respondents also deployed substantial privately owned equipment, including 34 ATVs and 27 fogging units, and reported using techniques including tactical back-burning, fogging, leafblowers and the excavation or swiping of firebreaks. The report is sector-produced practitioner evidence rather than an independent controlled assessment, and its Scottish context should not automatically be transferred to England. It nevertheless provides relevant comparative evidence that the people, skills and specialist equipment maintained for routine upland land management can also constitute a substantial wildfire-response capability (Scottish Land & Estates, 2025).
- 28.82 The report also identifies a potential counterfactual which Defra should test rather than assume. Scottish Land & Estates notes that ATVs and fogging units used during the fires are commonly, though not exclusively, purchased for muirburn operations, and argues that future restrictions on that management could affect both investment in such equipment and retention of associated skills. That is an inference from sector evidence rather than evidence that regulatory change has already caused those capabilities to be lost. Its relevance is that it identifies a plausible mechanism which should form part of policy appraisal: where regulation changes the management activity which currently sustains specialist personnel, training and equipment, Defra should assess whether those capabilities would also change and, if so, how equivalent wildfire-response capacity would be maintained or replaced (Scottish Land & Estates, 2025).
- 28.83 Wildfire risk and resilience must therefore form part of Defra’s assessment of the environmental and social consequences of any policy affecting upland management. That assessment should include vegetation-fuel condition, hydrological condition, emergency-response capability, access, equipment, practitioner presence and the retention of specialist upland-management knowledge.

Anticipatory and cumulative regulatory impacts

- 28.84 The regulatory effect should not be measured only from the date on which any future intervention formally takes effect. Expectations of possible regulatory change, uncertainty about its eventual scope and the prospect of repeated changes can influence employment, investment and land-management decisions before any decision has been taken on whether further intervention is required. Estates and other rural businesses make decisions about recruiting and training staff, retaining vacant posts, maintaining infrastructure and funding long-term habitat management over periods extending well beyond a single season. Where the future legal or operational position remains unclear, investment may be deferred and posts may be left unfilled before any new regulatory mechanism has been selected or implemented.

Evidence from Scotland

- 28.85 There is relevant practitioner evidence from Scotland. On 7 June 2023, the Scottish Gamekeepers Association launched a survey of its members seeking information about gamekeeping, wildlife-management and ghillie jobs lost, gained or phased out over the preceding five or ten years. It stated that the purpose was to establish an aggregated regional picture of changing employment and the positive or negative effects of legislative change (Scottish Gamekeepers Association, *Take our JOBS survey—and receive a free gift*, 7 June 2023).

- 28.86 On 12 August 2023, while the Wildlife Management and Muirburn Bill was still before the Scottish Parliament, the SGA reported that responses received to that point indicated that positions were being lost and posts were not being replaced. It described the overall trend as clear and concerning. The SGA associated this with several interacting pressures, including estate sales and land-use change linked to woodland and carbon schemes, poor grouse-shooting years, cumulative regulatory change and uncertainty surrounding the proposed Bill and other wildlife-management regulation (Scottish Gamekeepers Association, *Warning to Scottish Government that gamekeeping profession is “close to breaking point”*, 12 August 2023).
- 28.87 This is relevant member-reported and practitioner evidence, but its limitations should be recognised. The published SGA material does not state how many people responded to the survey, quantify the total number of jobs lost or not replaced, provide a regional breakdown, or establish the cause of each employment decision. Nor could it demonstrate the subsequent effect of the grouse-shoot licensing regime, because it was published before that regime became operational. It nevertheless provides evidence that employment contraction and reduced confidence were already being reported during the period of prolonged regulatory and land-use uncertainty. Any assessment of a future policy intervention should therefore include anticipatory and cumulative effects rather than measuring impacts only from the date on which that intervention, if adopted, formally takes effect.

Periodic review, investment drag and the regulatory ratchet

- 28.88 The Scottish Government’s own arrangements add to the importance of long-term certainty. Its Business and Regulatory Impact Assessment states that the statutory codes of practice for grouse-moor management and muirburn are to be reviewed at least every five years (Scottish Government, *Wildlife Management and Muirburn (Scotland) Bill: Business and Regulatory Impact Assessment*, 2023, section 17). Periodic review can support evidence-led and adaptive regulation, but only where the assessment process, evidential thresholds and possible outcomes are clear.
- 28.89 Otherwise, repeated review can itself create an investment “drag”. Businesses making long-term decisions about staff, infrastructure and habitat management may reasonably perceive that requirements can be progressively tightened while there is no equivalent mechanism by which evidence of compliance, successful outcomes or overstated risks will produce stability, simplification or relaxation. That creates the risk of a regulatory ratchet: successive reviews respond to continuing pressure for additional restriction, while the regulated activity never reaches a sufficiently settled position to support confident long-term investment.
- 28.90 Over time, the resulting uncertainty can reduce employment and management capacity without any express prohibition. The endpoint may be the practical loss of an activity because investment has withdrawn, posts have not been replaced or lawful operation has become unviable or unobtainable in practice - not because Parliament has expressly considered and justified a ban. Where licensing is adopted, the nominal availability of a licensed activity should not by itself be treated as meaningfully permitting that activity if the cumulative requirements, uncertainty or administration produce an equivalent outcome.
- 28.91 This is not an argument against review or against stakeholders advocating regulatory change. It is an argument for transparent and symmetrical review. If Defra subsequently proposes a new regulatory regime, it should be capable of tightening requirements where evidence demonstrates continuing harm, but also of retaining, simplifying or relaxing them where outcomes are being achieved or anticipated risks have not materialised. The baseline, methodology, assessment criteria, evidential thresholds and range of possible outcomes should be published before any such intervention is

implemented. This would allow those affected to understand what success looks like, enable them to invest with reasonable confidence and reduce the risk that beneficial land management is lost alongside the particular harms regulation is intended to address.

Rural proofing and integration of economic evidence

- 28.92 This requirement is reinforced by Defra's own *Future of Rural England Report*, published in July 2026. The report rejects rural proofing as an "end of pipe" exercise undertaken after policy has been developed. It instead commits government to taking rural needs into consideration at every stage of policymaking and to ensuring that departments systematically assess the real-world effects of policy and investment decisions on rural communities. It also recognises that rural employment is dominated by small and medium-sized enterprises, that those businesses require a supportive regulatory environment, and that regulatory barriers increase costs and constrain growth.
- 28.93 Any policy option emerging from this Call for Evidence should therefore be rural-proofed before options are selected, rather than assessed only after an intervention has been designed or implemented. That appraisal should identify the distributional and place-based effects on permanent, seasonal and casual employment; recruitment and retention; tied accommodation; local contractors, hospitality and other rural businesses; specialist land-management skills; private conservation expenditure; and the capacity of remote communities to replace any economic and management activity lost. Policy options should not therefore be selected on the basis of the environmental evidence alone and subjected to economic and rural assessment afterwards. Defra's commissioned economic assessment must form part of the evidence considered before the case for, and design of, any intervention is determined.
- 28.94 Any review mechanism attached to a future intervention should therefore be transparent and genuinely capable of moving in either direction. Its methodology, evidential thresholds and possible outcomes should be clear enough to give affected businesses reasonable regulatory certainty, while allowing requirements to be tightened where evidence demonstrates continuing harm or simplified where outcomes are being achieved.

Conclusion: an outcomes-based and evidence-led approach

- 28.95 Taken together, the MA considers that Question 28 reinforces the need for an outcomes-based approach: genuine risks should be identified and addressed through evidence and high standards, but the environmental and social benefits associated with responsible management must also be included when assessing the consequences of future policy. The appropriate objective should be to determine which combination of interventions produces the best evidenced environmental outcome under realistic alternative land-management scenarios, rather than assuming in advance that any one management model is inherently preferable.

Question 29: Are there any additional positive or negative impacts, not covered above, for example recreational benefits?

- 29.1 The Moorland Association's response relates principally to red grouse shooting and associated upland land management.
- 29.2 The MA considers that there are important recreational and social impacts associated with red grouse shooting which should form part of Defra's assessment. These should not be confused with the economic impacts which Defra is assessing separately.

Evidence base and interpretative limitations

- 29.3 An important source of evidence is *Sustainable Driven Grouse Shooting? A review of the evidence of the economic, environmental and social sustainability of driven grouse shooting* (Denny, 2023). The second edition reviewed a substantial body of published and other evidence and was produced with independent oversight by Professor James Crabbe and review by academics from three UK universities who, according to the report, were not involved in shooting or field sports. The MA would provide this report as supporting evidence to this response.
- 29.4 A central conclusion of that review is that driven grouse shooting should not be considered simply as the act of shooting a bird. It forms part of a wider system of integrated moorland management and participation, producing environmental, social and economic effects. The report argues that these effects, and the consequences of alternative land-management models, need to be considered together when assessing sustainability.
- 29.5 These social effects are also recognised in research commissioned by the RSPB. Rayment's independent assessment of future options for grouse-moor management concluded that grouse moors are generally recognised as playing a role in maintaining some upland rural communities through employment and local economic activity, and may contribute to cultural heritage and community identity. The report also recognised evidence of localised population retention and maintenance of cultural and community identity, while identifying both negative impacts and uncertainty about the extent to which alternative land uses could reproduce the same benefits (Rayment, *Driven Grouse Shooting: Assessing the economic and social impacts of future options for grouse moor management*, report commissioned by RSPB, 2022).
- 29.6 Social evidence of this kind requires careful interpretation. Much of it is observational or survey-based and can identify associations, reported experiences and plausible mechanisms without necessarily establishing that grouse shooting itself caused the observed outcome. Participation studies may also be affected by self-selection: people who choose to participate in shooting or associated rural activities may differ from the wider population in ways relevant to wellbeing, identity or community attachment. The MA therefore relies on this evidence as demonstrating social impacts which merit consideration, rather than as proof that every observed difference was caused solely by grouse shooting.
- 29.7 More recent evidence provides a complementary English-upland perspective. The Regional Moorland Groups' *People's Plan for the Uplands* reports an online survey of 196 respondents connected with the English uplands, including people involved in gamekeeping, farming, conservation, hospitality, policing and healthcare. Of those responding, 62.8% identified biodiversity as what they valued most about the uplands, while 41% identified a decline in traditional ways of living as their principal concern; the report records respondents linking changes in traditional land management with concerns about the condition of the moors, employment, businesses and community continuity. The survey was self-selected, with participants recruited principally at agricultural shows and through Regional Moorland Group channels, and was not designed as a representative sample of the English upland population. Its percentages should therefore not be extrapolated to the wider population. It is nevertheless relevant as documented experiential evidence of how some people who live, work in or use the uplands perceive the relationship between environmental management and social outcomes (*The People's Plan for the Uplands*, 2024).
- 29.8 A further contemporary English source provides evidence about the wider roles performed by people employed within grouse-moor management. Denny (2025) surveyed 58 English grouse moors covering approximately 444,000 acres and employing 194 gamekeepers. The report records

gamekeepers undertaking activities extending beyond preparation for shooting, including habitat and wildlife management, wildfire preparedness and response, liaison with Fire and Rescue Services, and practical support on land not itself managed for grouse shooting. Between 2021 and 2024, respondents reported attending 114 meetings with Fire and Rescue Services and providing wildfire-management training to Fire and Rescue personnel on 111 occasions. They also reported responding to wildfires on grouse moors other than their own and on land where grouse shooting did not take place, including land managed by utilities, conservation organisations, military interests and National Nature Reserves (Denny, 2025).

- 29.9 This is commissioned, self-reported practitioner evidence rather than peer-reviewed research and should be weighted accordingly. The survey covered 58 of the approximately 140 moors represented through the Regional Moorland Groups and was commissioned by organisations representing the sector. Its methodological safeguards included checking returns against incident logs, work records and estate accounts and excluding returns considered unreliable. Its relevance to this question is therefore not to establish a quantified national public benefit, but to demonstrate that employment and participation associated with grouse-moor management can maintain practical skills, relationships and local response capacity which are used for purposes extending beyond the recreational activity itself.

Recreation and participation

- 29.10 Red grouse shooting is a recreational activity involving the managed harvest of a wild bird population, with shooting taking place only where annual productivity produces a harvestable surplus. Participation is considerably wider than the individuals who shoot. A driven grouse day may involve gamekeepers, beaters, flankers, pickers-up with dogs, drivers and other participants, as well as those shooting. The report notes that a driven day can involve more than 50 people and describes an extensive network of roles associated with the activity.
- 29.11 This broad participation is relevant when considering recreational benefit. For many participants the activity involves spending substantial periods outdoors, physical activity, working with dogs, wildlife observation and participation in a shared rural activity.

Community cohesion and sense of belonging

- 29.12 A 2020 study of upland communities in areas where grouse-moor management is practised, cited by Denny (2023) as Denny & Latham-Green (2020), found that 74% of respondents participated in driven grouse shooting in some capacity, with participation spanning both sexes and different age groups. The study also reported comparatively high levels of community attachment and sense of belonging. These findings are relevant evidence of the extent to which grouse shooting can be embedded within some upland communities, but they should be treated as evidence from the communities studied rather than assumed to be representative of every English upland community.
- 29.13 Separate research cited in the review found that a majority of respondents in two Scottish study areas perceived community-level benefits from grouse shooting: 70% in the Angus Glens and 53% in the Monadhliath. The MA recognises that these are Scottish case studies rather than direct measurements of English upland communities, but they provide relevant comparative evidence that residents in some grouse-moor areas perceive community-level benefits. Because these are Scottish case studies, Defra should be cautious in generalising the percentages directly to English upland communities.

- 29.14 The evidence also suggests that employment and participation associated with grouse moors can help maintain an intergenerational mix within rural communities. This is potentially important in areas affected by the outward migration of younger people and an ageing population.

Mental health, wellbeing and physical activity

- 29.15 Research cited by Denny (2023), principally Latham-Green (2020), surveyed 2,424 participants in driven game shooting, including grouse shooting, and used the recognised Short Warwick-Edinburgh Mental Well-being Scale. Participants reported statistically higher wellbeing scores than the national comparison used in the study.
- 29.16 This is relevant evidence of an association between participation and wellbeing, but it should not be interpreted as demonstrating that shooting itself caused the difference. The study population consisted of people who had chosen to participate in driven game shooting and was not a random sample of the general population. Factors associated with participation (including outdoor activity, exercise, social interaction, shared purpose and contact with the natural environment) may themselves contribute to the observed difference. The appropriate conclusion is therefore that participation can be associated with positive wellbeing effects and that these effects should form part of the policy assessment, not that a quantified causal health benefit has been established.
- 29.17 Physical activity is another potentially important benefit. Beating and other participation can involve substantial walking over difficult upland terrain. The evidence review also notes that estate tracks and paths maintained in connection with moorland management may facilitate access and exercise by local communities and visitors throughout the year.

Rural identity, skills and cultural heritage

- 29.18 The same study of 2,424 driven-game-shooting participants found that 91.3% of respondents indicated that a connection to the countryside was a reason for their participation. There was no statistically significant difference in this measure between rural and urban respondents. This is evidence of a strong association between participation in driven game shooting and rural identity among those surveyed. It does not establish whether participation created that identity, reinforced a pre-existing identity, or attracted people who already identified strongly with the countryside. Nevertheless, it demonstrates that countryside identity and sense of place are relevant social dimensions of participation which should not be omitted from the assessment.
- 29.19 The cultural significance of red-grouse management has also been recognised outside the shooting sector. The IUCN SSC Grouse Specialist Group's 2007 conservation action plan described red-grouse management as having a long tradition and considerable cultural and economic importance in Britain (IUCN SSC/WPA/BirdLife Grouse Specialist Group, 2007). This historical international source does not quantify the present scale of that cultural significance, but it demonstrates that the association between red-grouse management and British upland culture is longstanding rather than a recent sector characterisation.
- 29.20 In the community research undertaken by Mc Morran, Bryce & Glass (2015) in the Monadhliath and Angus Glens, 75% of community-survey respondents agreed or strongly agreed that grouse shooting was an important part of the culture and history of the community. This should be treated as evidence of perceived cultural significance within the two Scottish study areas rather than assumed to represent every upland community.

- 29.21 The 2023 evidence review places evidence of this kind within the wider concept of intangible cultural heritage: social practices, seasonal activities, knowledge and skills that communities may regard as part of their cultural heritage.
- 29.22 Further contemporary evidence of this cultural significance comes from the Our Upland Living Heritage initiative undertaken in early 2026, before the present Call for Evidence was launched. The initiative sought community consent for the proposed inclusion of “Community Grouse Conservation and Shooting” in the UK Inventories of Living Heritage. Participants were asked not simply to register support, but to identify their role within the community (including gamekeepers and land managers, farmers, beaters and flankers, dog handlers, local businesses, rural residents and sporting participants) and were invited to describe the moorland traditions and cultural practices they wished to see acknowledged and preserved.
- 29.23 By 17 March 2026, more than 1,500 people had pledged their support. The UK Living Heritage process itself places particular emphasis on evidence that a tradition is recognised, maintained and transmitted by a living community of practice, and requires evidence of free, prior and informed community consent. The response to the initiative should not be treated as a representative opinion poll of the wider public or as evidence that every upland resident shares the same view. It does, however, provide relevant contemporary evidence that a substantial community of participants regards grouse-moor management and its associated skills, traditions and social practices as part of its cultural heritage.
- 29.24 The relevance of this cultural evidence is not confined to identity or tradition. It also concerns the maintenance and transmission of practical knowledge. Denny (2025) records gamekeepers undertaking wildlife and habitat management, vegetation management, wildfire preparedness and response and cooperation with other land managers and emergency services. That evidence indicates that at least some of the specialist knowledge associated with grouse-moor management is applied beyond the act of shooting itself.
- 29.25 There is also peer-reviewed ecological literature recognising the existence of this practitioner capability. Whitehead, Weald & Baines (2021), in their study of prescribed burning and blanket-bog vegetation at Langholm, note the practical fire-management experience and equipment held by gamekeepers and identify the potential loss of that capability if the associated management activity ceases. The study was ecological rather than sociological, was conducted on a single Scottish moor and was written by GWCT-affiliated authors, so it should not be treated as evidence that such skills could not be supplied under another land-management system. Its relevance is narrower: specialist practitioner capability is a real component of the existing management system and should form part of the counterfactual where policy could materially change that system (Whitehead, Weald & Baines, 2021).
- 29.26 This is consistent with Defra’s Future of Rural England Report, which recognises the importance of heritage, traditional skills and husbandry within a sustainable and diverse agri-environmental sector. The appropriate policy question is therefore not simply how many jobs or shooting opportunities would remain under an alternative scenario, but which specialist skills and community functions would continue, which would be replaced through other arrangements and which might be lost.

Negative social impacts

- 29.27 A balanced assessment should also acknowledge potential negative impacts. Research cited in the report records concerns from some respondents about matters including temporary disturbance, noise or smoke associated with particular activities, perceived access restrictions, public-safety

concerns and impacts on some wildlife. In one community study, positive impacts were reported substantially more frequently than negative ones, but those negative experiences should not simply be disregarded.

- 29.28 The MA considers that such impacts should be assessed according to their nature, scale and frequency and, where appropriate, addressed through good practice and engagement with other users of the uplands.

The importance of the counterfactual

- 29.29 Defra should also assess how these social and recreational effects would change under credible alternative land-management scenarios. Rayment’s RSPB-commissioned assessment expressly recognised that different options for the future of grouse moors could have different consequences for employment, land management, community identity and cultural heritage and that the ability of alternative land uses to reproduce existing benefits was uncertain (Rayment, 2022). The relevant counterfactual is therefore not simply “shooting” versus “no shooting”, but the complete social and management system which would operate under each realistic alternative.
- 29.30 That comparison should avoid assumptions in either direction. It should not be assumed that community networks, outdoor participation, practical conservation skills or wildfire-response capability would automatically disappear if grouse shooting ceased: some might continue under farming, conservation, forestry, tourism, public funding or other land uses. Equally, it should not be assumed that they would continue at their present scale, in the same places or without replacement funding and organisation. The evidence required is therefore evidence about what activities, people, institutions and resources would actually replace the existing system.
- 29.31 The contemporary English evidence indicates that the existing system supports a network of participation and practical activity wider than the people who shoot. The People’s Plan for the Uplands records perceptions of community continuity and traditional ways of life; the Our Upland Living Heritage initiative provides evidence that a substantial community regards the associated practices as part of its living cultural heritage; and Denny (2025) records practitioner roles extending into conservation management, skills transfer and emergency-response cooperation. Each source has limitations and none demonstrates that grouse shooting is the only mechanism capable of producing those outcomes. Together, however, they establish that the social counterfactual has substantive components which should be identified and assessed rather than treated as zero.
- 29.32 These benefits do not override demonstrated environmental, animal-welfare or other social harms. Conversely, the existence of alternative recreational or conservation uses does not establish that existing social benefits would automatically be replaced. Defra’s assessment should therefore compare the recreational, cultural and social consequences of credible alternative land-management scenarios on the same evidential basis, including participation, wellbeing, community networks, specialist knowledge, access and any negative effects experienced by other users of the uplands.
- 29.33 Red grouse shooting should consequently be assessed not simply at the point at which a wild bird is harvested, but as one component of a wider system of recreation, land management, participation and community activity. The policy-relevant question is how those effects—positive and negative—would change under each realistic alternative rather than whether they can be assigned a single overall value to grouse shooting itself.

Question 30: Would you like to answer questions about gamebird welfare during breeding or rearing?

[No \[skip to end\]](#)

