ANNEX 1 – Moorland Association, Evidence Schedule

Purpose of this schedule

This schedule identifies the principal evidence relied upon in the Moorland Association's response. It is intended to assist Defra in assessing the provenance, relevance, evidential status and limitations of that material, and in distinguishing between peer-reviewed primary research, government and statutory evidence, independent or commissioned reviews, sector-produced evidence, operational and practitioner evidence, and analysis undertaken by the Moorland Association.

The schedule is not intended to imply that all sources carry equal evidential weight. The appropriate weight will depend on matters including study design, sample size, geographical and temporal relevance, whether an association or causal effect has been demonstrated, the existence of controls or appropriate comparators, the quality of the underlying data, and the extent to which findings have been replicated or remain uncertain. Where material limitations are relevant to the propositions relied upon by the MA, they are identified either in this schedule or in the corresponding answer.

The inclusion of a source does not imply that the Moorland Association accepts every finding, interpretation or policy recommendation contained within it. Some sources are relied upon for particular empirical findings, others for evidence of uncertainty or evidential gaps, and others for principles of regulatory design or evidence assessment. Where a report contains conclusions or recommendations with which the MA does not necessarily agree, its inclusion should be understood only as reliance upon the particular evidence or proposition identified in the relevant response and in this schedule.

Where secondary reviews or evidence syntheses are cited, the MA encourages Defra, where material, to consider the underlying primary studies rather than relying solely upon the interpretation provided by the reviewing organisation. Conversely, sector provenance should not itself determine whether evidence is accepted or rejected: the relevant questions are the quality of the underlying evidence, the transparency of the methodology and whether the proposition relied upon is adequately supported.

A number of sources concern Scotland or the wider UK rather than England alone. These are included where they provide relevant comparative evidence concerning the ecology, management or regulation of broadly comparable upland systems. The MA does not assume that findings from another jurisdiction or landscape are automatically transferable to England. Their applicability should be considered in light of differences in habitat, management, species populations, legal frameworks and local circumstances.

Operational, practitioner and member-reported evidence is included where it addresses matters that may not be captured fully by published experimental research, including management practice, restoration activity, monitoring, participation and practical delivery. Such evidence should be treated according to its provenance and limitations and should not be represented as equivalent to independently audited or peer-reviewed evidence where it is not. Equally, its practical relevance should not be disregarded solely because it originates from practitioners.

The schedule should therefore be read alongside the substantive answers, which identify the particular proposition for which each source is relied upon and, where necessary, the qualifications that attach to it. The MA's wider submission is based on the principle that evidence should be described according to what it can reasonably establish: observed outcomes should be distinguished from proxies, correlation from causation, population-level inference from proof in an individual case, and scientific findings from the subsequent policy judgements made on the basis of them.

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Denny, S. (2023), Sustainable Driven Grouse Shooting? A review of the evidence of the economic, environmental and social sustainability of driven grouse shooting, 2nd edition	Sector-commissioned secondary evidence review, produced with independent academic oversight	Principally UK uplands / driven grouse shooting	Environmental, economic and social evidence concerning driven grouse shooting and associated moorland management	Used as a route into a substantial body of primary and secondary evidence concerning biodiversity, protected sites, management practices, standards and social effects	Commissioned by Regional Moorland Groups and is a secondary review rather than a primary experimental study. Individual propositions should therefore be considered against the underlying studies where material. Evidence quality and applicability vary between topics and studies	**Q10, Q12, Q14, Q29**
Fletcher, K.L., Aebischer, N.J., Baines, D., Foster, R. & Hoodless, A.N. (2010), "Changes in breeding success and abundance of ground-nesting moorland birds in relation to the experimental deployment of legal predator control", Journal of Applied Ecology, 47, 263–272, DOI 10.1111/j.1365-2664.2010.01793.x	Peer-reviewed experimental study	Northern England uplands	Effect of legal predator control on breeding success and abundance of upland birds	Eight-year field experiment. Predator control was associated with an average threefold increase in breeding success of lapwing, golden plover, curlew, red grouse and meadow pipit, followed by population responses in several species	Findings concern the experimental areas, species and management regime studied. Effects should not automatically be generalised to every species, site or form of grouse-moor management; snipe did not show the same population response	**Q8, Q9, Q12, Q14**
Aebischer, N.J., Ewald, J.A. & Tapper, S.C. (2010), "Driven grouse shooting in Britain: a form of upland management with wider conservation benefits", in Allen, P. (ed.), Ecologic and Economic Benefits of Hunting, pp.186–201	Published landscape-scale synthesis	Britain / upland grouse-management landscapes	Distribution and trends of upland birds in relation to grouse management	Relevant to evidence that breeding waders can be more numerous on grouse-managed land and that range contraction differed between areas retaining and losing grouse management	Primarily synthesis and observational evidence rather than a controlled landscape experiment. Associations do not alone establish that grouse management caused observed differences; other landscape and land-use factors may contribute	**Q9**
Ludwig, S.C., Roos, S. & Baines, D. (2019), "Responses of breeding waders to restoration of grouse management on a moor in South-West Scotland", Journal of Ornithology, 160, 789–797	Peer-reviewed observational / before-and-after study	Langholm, south-west Scotland	Response of breeding waders following restoration of grouse-moor management, including predator control	Reports increases in curlew, golden plover and snipe following restoration of grouse management and is relevant to potential biodiversity effects of the wider management package	Single Scottish landscape. Management involved a package of interventions and attribution to any individual component requires caution. Applicability elsewhere depends on local ecological circumstances	**Q9, Q12, Q14**
Baines, D., Fletcher, K.L., Hesford, N., Newborn, D. & Richardson, M. (2023), "Lethal predator control on UK moorland is associated with high breeding success of curlew, a globally near-threatened wader", European Journal of Wildlife Research, 69:6	Peer-reviewed field research	UK moorland	Relationship between legal generalist-predator control and curlew breeding productivity	Across paired study sites, curlew productivity was around four times higher on grouse moors than non-grouse moors, with breeding outcomes associated with lower indices of foxes and corvids	Observational paired-site study rather than experimental manipulation. Findings concern the sites examined and should not be assumed to demonstrate identical effects in every landscape	**Q8, Q9, Q12, Q14**
Baines, D., Fletcher, K., Howarth, D., Newborn, D. & Richardson, M. (2014), "Grouse moor management: effects on other upland birds in the UK"	Published review / synthesis	UK uplands	Effects of grouse-moor management on non-target upland birds	Provides supporting synthesis concerning relationships between predator management, habitat management and distribution or breeding performance of upland birds	Review/synthesis rather than a new controlled experiment. Conclusions depend upon the underlying studies and should be considered alongside them	**Q9**
Newey, S., Mustin, K., Bryce, R., Fielding, D., Redpath, S., Bunnefeld, N., Daniel, B. & Irvine, R.J. (2016), "Impact of Management on Avian Communities in the Scottish Highlands", PLoS ONE, 11(5), e0155473	Peer-reviewed observational study	Scottish Highlands; 26 landholdings	Bird-community composition under different upland management regimes	Shows that intensive grouse management was associated with differences in occurrence and abundance of individual bird species and emphasises that responses vary substantially among species	Observational comparison. Management categories contain several associated practices and environmental differences, limiting attribution to individual interventions. Results include positive and negative species associations	**Q8**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Newey, S., Fielding, D.A., Miller, D.G., Matthews, K.B. & Thomson, S. (2020), Biodiversity considerations on grouse moors: Part 4 of Research to assess socioeconomic and biodiversity impacts of driven grouse moors and to understand the rights of gamekeepers, report to the Scottish Government	Government-commissioned biodiversity analysis	Scotland	Relationship between grouse-management intensity and distribution of selected upland indicator species	Relevant because it assesses individual species rather than treating grouse-moor management as having one uniform biodiversity effect	Wide-scale correlative analysis rather than experimental evidence. Management intensity may covary with habitat, geography and other pressures. Associations for individual species should not automatically be interpreted causally	**Q9**
Littlewood, N.A., Mason, T.H.E., Hughes, M., Jaques, R., Whittingham, M.J. & Willis, S.G. (2019), "The influence of different aspects of grouse moorland management on nontarget bird assemblages", Ecology and Evolution	Peer-reviewed regional field study	Northern England and southern Scotland; 18 estates	Relative effects of legal predator control and heather burning on non-target birds	Found positive associations between predator-control effort and golden plover, curlew and, more weakly, snipe abundance; evidence of effects from burning was weaker	Observational study. Associations do not prove causation and benefits appeared to plateau at relatively low levels of predator-control effort	**Q8, Q12**
Mustin, K., Arroyo, B., Beja, P., Newey, S., Irvine, R.J., Kestler, J. & Redpath, S.M. (2018), "Consequences of game bird management for non-game species in Europe", Journal of Applied Ecology, 55, 2285–2295	Peer-reviewed systematic literature review	Europe, with most underlying studies from the UK	Effects of gamebird-management practices on non-target wildlife	Review found effects differed substantially according to practice; legal predator control was generally associated with positive or neutral effects on non-target populations, while other practices produced mixed outcomes	Evidence base was uneven across management practices and heavily weighted towards UK studies. Review covers gamebird management more widely and should not be treated as evidence specifically about every grouse-moor practice	**Q8, Q12**
Whitehead, S., Hesford, N. & Baines, D. (2018), Changes in the abundance of some ground-nesting birds on moorland in South West Scotland, GWCT research report	Sector-commissioned longitudinal / comparative research report	South-west Scotland	Long-term changes in ground-nesting moorland birds alongside changes in land use and grouse management	Relevant to the counterfactual discussion because it documents bird declines in landscapes experiencing changes including afforestation, agricultural change and reduced grouse management	Commissioned research report rather than peer-reviewed experimental evidence. Multiple land-use changes occurred simultaneously, making attribution to loss of grouse management alone inappropriate	**Q9**
Natural England (2024), The Influence of Recreational Activity on Upland Ecosystems in the UK: A Review of Evidence, NEER025	Natural England-commissioned evidence review	UK uplands	Evidence concerning recreational uses of uplands, including grouse shooting and associated management	Relevant because it identifies both positive and negative effects and evidence gaps rather than assigning a uniform ecological effect to grouse-moor management	Secondary evidence review. Natural England notes that commissioned evidence reports do not necessarily represent its policy position. Conclusions depend upon quality and availability of underlying studies	**Q8–14, Q28**
Natural England (2023), The Impacts of Vegetation Cutting on Peatlands and Heathlands, NEER028	Natural England evidence review	UK peatlands and heathlands	Ecological, hydrological and related effects of vegetation cutting	Relevant to comparison of management alternatives. Natural England found relatively few studies and reported that no relevant studies were available on impacts of cutting on wildfire risk	Limited evidence base; many studies lacked unmanaged controls. Absence of wildfire studies is an evidence gap, not evidence that cutting has no wildfire effect	**Q13–15, Q28(e)**
Natural England (2025), An evidence review update on the effects of managed burning on upland peatland biodiversity, carbon and water, NEER155	Government / statutory-body evidence review	UK upland peatlands	Effects of managed burning on biodiversity, carbon, water and hydrology	Updates Natural England's earlier evidence base using 102 additional studies. Relevant to both environmental effects and remaining uncertainty; Natural England records that UK evidence on burning and wildfire remains limited	Secondary review rather than primary experimental evidence. Effects vary according to habitat, severity, frequency and other management. Limited wildfire evidence does not establish that burning universally reduces wildfire risk	**Q8, Q12–15, Q28(e)**
Natural England (2026), Schedule 2 Species Assessment Proforma – (Common) Snipe, Natural England Technical Advice to Defra, January 2026	Government / statutory species assessment	England, drawing on wider UK evidence	Status, pressures and evidence relating to common snipe	Records evidence that grouse-moor management including predator control may benefit snipe, while also noting that the northern England predator-control experiment did not demonstrate the same benefit	Species-specific assessment. Identifies multiple pressures and demonstrates why findings for one study, management practice or species should not automatically be generalised	**Q8, Q9, Q12, Q14**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Stanbury, A.J. et al. (2021), "The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain", British Birds, 114	National conservation-status assessment	UK	Conservation status of UK bird species	Used to identify upland species of conservation concern, including curlew, lapwing, black grouse, woodcock, hen harrier, merlin and ring ouzel	Red or Amber listing establishes conservation concern; it does not identify the cause of decline or demonstrate that a particular land use is responsible	**Q9**
Principles of Sustainable Gamebird Management and associated sector codes and guidance	Industry standards / voluntary guidance drawing together legal and good-practice requirements	UK game management	Standards covering sustainable game management and responsible practice	Demonstrates an existing architecture of voluntary standards against which uptake, implementation and environmental performance can be assessed	Existence of a code is not evidence that it has been implemented or that the intended outcome has been achieved. Effectiveness requires evidence of adoption, compliance and outcomes	**Q10, Q21**
Defra & Natural England (2025), Heather and Grass Management Code 2025	Official Government good-practice code	England	Planning and conduct of vegetation management, including burning and cutting, sensitive habitats, soil carbon and wildfire considerations	Provides an official example of an outcomes-based management framework and recognises that management techniques have different advantages, disadvantages and site applications	Government guidance rather than evidence of environmental outcomes. Compliance with the Code does not itself demonstrate biodiversity or wildfire benefit	**Q10, Q13, Q15, Q28(e)**
Game & Wildlife Conservation Trust (2026), membership survey concerning voluntary restraint on woodcock and snipe shooting	Practitioner / membership survey	UK shooting community	Reported uptake of voluntary restraint	Reports that 89% of respondents did not shoot woodcock before the recommended date and 92% did not shoot snipe before 30 September; relevant to whether voluntary guidance can influence behaviour	Membership survey subject to self-selection, self-reporting and representativeness limitations. Demonstrates reported behaviour among respondents rather than population-wide compliance or biodiversity outcome	**Q11**
Corry, D. (2025), Delivering economic growth and nature recovery: an independent review of Defra's regulatory landscape	Independent Government-commissioned review	Environmental regulation in England	Regulatory effectiveness, proportionality, outcomes, adaptability and relationships with regulated parties	Supports outcome-focused, proportionate and adaptive regulation and the principle that demonstrably good performers can receive greater autonomy or earned recognition	Not a review of grouse shooting and provides no ecological evidence about gamebird activities. Used solely for principles of regulatory design and implementation	**Q10**
Cottam, H. / Defra (2026), Towards a flourishing uplands: phase 1	Defra-published participatory / policy review	English uplands	Relationships between people, place, nature, governance and delivery in upland policy	Supports local knowledge, co-design, longer-term approaches and recognition that upland challenges are interconnected	Did not investigate gamebird regulation or establish ecological effects of grouse shooting. Used for governance and implementation propositions rather than ecological evidence	**Q11**
Defra (2025), Environmental Improvement Plan 2025	Government environmental policy and monitoring framework	England	Environmental targets, SSSI features, biodiversity indicators, climate adaptation, monitoring and evaluation	Supports outcomes-based management, monitoring, adaptive delivery and treatment of wildfire resilience as a climate-adaptation issue	Policy framework rather than primary scientific evidence. Establishes Government objectives and delivery principles rather than proving effects of particular management practices	**Q14, Q28(e)**
Defra (2026), Environmental Improvement Plan: Annual Progress Report 2025 to 2026	Government monitoring / progress report	England	Progress against EIP goals, actions and Environment Act targets	Relevant to emphasis on measurable delivery, monitoring, evaluation and multiple interacting pressures rather than simple attribution of protected-site condition to one land use	Programme-level reporting does not establish causation at individual protected sites and should not substitute for feature- and site-specific evidence	**Q14, Q28(e)**
Natural England SSSI unit-condition data for Moor House–Upper Teesdale	Official statutory monitoring data	Moor House–Upper Teesdale NNR / SSSI	Formal condition classifications of individual SSSI units	Used to illustrate the distinction between condition and causal attribution: MA review records five of 25 units as favourable and 20 within an unfavourable category	"Unfavourable" includes different trajectories, including unfavourable recovering. The data do not demonstrate that Natural England or current management caused the condition; historic and multiple current pressures may apply	**Q14**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Natural England (2021), “An update on another encouraging year for breeding Hen Harriers in England”, 13 August 2021	Official statutory-body breeding update	England / hen harrier population	Hen harrier breeding attempts, successful nests, fledged young and delivery of the Hen Harrier Action Plan	Records 31 breeding attempts, 24 successful nests and 84 fledged chicks in 2021 and provides context on developing population recovery	Single-year monitoring does not establish cause of longer-term population increase. Natural England continued to identify illegal killing and other bird-of-prey crime as a principal constraint on sustained recovery	**Q9**
Natural England (2023), Holmes, J., “Update on the Hen Harrier Brood Management Trial”, 16 March 2023	Official statutory-body interim trial assessment	England / brood-management trial	Changes in hen harrier nesting attempts during the trial	Records an increase from 12 nesting attempts in 2018 to 49 in 2022, with the increase occurring mainly on land managed wholly or partly for grouse shooting	Interim assessment produced before completion of the trial. At that stage Natural England stated that the relationship between brood management and the increase could not yet be established conclusively	**Q9**
Natural England (2026), Hen Harrier Brood Management Trial Evaluation: The effectiveness of brood management as a mechanism for supporting hen harrier recovery, NERR153	Government / statutory-body final scientific evaluation	Northern England / trial period 2018–24	Effectiveness of brood management in supporting hen harrier recovery	Natural England records substantial growth in wild nesting hen harriers, with the strongest increases on grouse moors where brood management was available, and concludes that availability of brood management appears likely to have led to more hen harriers breeding successfully on grouse moors	Does not conclude that brood management alone caused recovery. Illegal killing continued and remains a significant constraint. Findings support contribution rather than sole causation	**Q9, Q21**
Murgatroyd, M., Redpath, S.M., Murphy, S.G., Douglas, D.J.T., Saunders, R. & Amar, A. (2019), “Patterns of satellite tagged hen harrier disappearances suggest widespread illegal killing on British grouse moors”, Nature Communications, 10, 1094	Peer-reviewed spatial survival / satellite-tracking study	Britain / tagged hen harriers	Relationship between disappearance/mortality and use of grouse moors	Important evidence reporting an association between use of grouse moors and increased probability of birds dying or disappearing; authors concluded illegal killing was the most likely explanation for the observed pattern	Population-level spatial analysis does not establish the fate, perpetrator or circumstances in every individual case. The study recorded direct evidence of illegal killing in a smaller number of birds alongside a larger number of unexplained disappearances	**Q20–21**
Moorland Association satellite-tagged hen harrier register and analysis	MA-compiled observational dataset and analysis	Hen harriers tracked by Natural England and MA since 2002	Final transmissions, recorded fate and geographical classification of satellite-tagged birds	Used to examine what can reasonably be inferred from individual final transmissions and to demonstrate that unexplained disappearance/tag cessation also occurs away from driven-grouse land	Not peer reviewed. Final-location classification is not a substitute for Murgatroyd et al.’s spatial survival analysis and does not model exposure to grouse-moor habitat through time. The approximately 53%/47% comparison is descriptive and dependent on MA classification rules and denominators	**Q20–21**
Defra / Raptor Persecution Priority Delivery Group confirmed raptor-persecution incident data published through MAGIC (2017; covering 2011–15)	Official Government / multi-agency crime dataset	England and Wales	Geographical record of confirmed raptor-persecution incidents	Provides precedent for an authoritative public dataset based on defined confirmed incidents and supports the MA proposal for a transparent, regularly updated evidence base	Historical dataset and cannot describe current incidence of crime. MA notes that the stated intention to update it annually does not appear to have resulted in an equivalent current public dataset	**Q20**
Police / National Wildlife Crime Unit information and correspondence referred to in the response	Official operational / stakeholder information	England / UK wildlife-crime policing	Classification, communication and reporting of wildlife-crime information and information supplied to Government	Relevant to the MA request that confirmed offences, suspected incidents, intelligence, statistical inference and unexplained events are clearly distinguished in evidence used for policymaking	Operational information may be incomplete or legitimately constrained by investigation and intelligence sensitivities. MA correspondence records questions and concerns; it does not establish the incidence of wildlife crime	**Q20–21**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Game & Wildlife Conservation Trust (2020), Medicated Grit Guidelines: Best practice use of medicated grit, together with current GWCT best-practice guidance	Technical practitioner guidance	UK red-grouse management	Veterinary use of flubendazole, parasite monitoring, withdrawal periods, grit management and environmental safeguards	Relevant to distinction between lawful targeted use and misuse and to measures intended to reduce environmental and food-chain risk	Guidance is not evidence that all practitioners comply or that all environmental risks have been eliminated. Effectiveness depends upon implementation and veterinary oversight	**Q28(b)**
Meister, F.J., Williamson, L. & Hesford, N. (2025), The Environmental Impact of Medicated Grit, Game & Wildlife Conservation Trust	Rapid evidence assessment	Wider evidence potentially relevant to UK grouse moors	Potential environmental effects of flubendazole/fenbendazole	Identifies an important evidence gap under UK upland conditions. Review found little or no toxicity in most terrestrial evidence but clearer potential risks in aquatic environments and recommends further field research	Initial search found no directly relevant UK grouse-moor studies. Evidence had to be broadened to other contexts and should therefore not be treated as definitive proof of either safety or harm under grouse-moor conditions	**Q28(b)**
Lees, K.J. et al. (2026), "Wildfire size, severity and timing vary with dominant vegetation in open landscapes in England and Wales", Ecological Solutions and Evidence, 7(3), e70254, DOI 10.1002/2688-8319.70254	Peer-reviewed empirical wildfire study	England and Wales; 206 wildfires	Relationships between vegetation type, management, wildfire size and severity	Provides direct observed-fire evidence. Reports larger fires in Molinia-dominated landscapes, greater severity with higher heather cover and significantly smaller fires in areas associated with managed burning than in unmanaged areas	Observational study; vegetation and management may be confounded. Too few fires in cut areas for robust testing and only a small number of visibly restored sites could be identified. Does not demonstrate that burning universally reduces wildfire severity or that restoration is ineffective	**Q28(e)**
Schoenecker, J. et al. (2026), "Widespread peat carbon losses driven by the 2025 Scottish megafire", Nature Geoscience, 19, 763–766	Peer-reviewed wildfire / carbon study	Dava and Carrbridge fire, Scotland	Peat and vegetation combustion, drought, fuel conditions and carbon emissions	Demonstrates potential carbon consequences of severe peatland wildfire; approximately 84% of estimated carbon emissions were attributed to peat combustion	Single major Scottish fire. Does not establish what management intervention would have prevented or reduced the incident. Exceptional drought and soil-moisture conditions were central	**Q28(e)**
Denny, S. & Latham-Green, T. (2020), What Impacts does Integrated Moorland Management, including Grouse Shooting, have on Moorland Communities? A Comparative Study, report for the Uplands Partnership	Commissioned community / comparative social research	UK upland communities	Participation in grouse shooting, social impacts, community attachment, employment and rural life	Study involved 644 participants. Of 396 survey respondents living in moorland communities, 74% reported participating in shooting in some capacity. Relevant to evidence that participation extends beyond those who shoot and can be embedded within some upland communities	Commissioned by the Uplands Partnership and not a peer-reviewed population survey. Participation and respondents were self-selecting and results should not be assumed to represent all English upland communities	**Q29**
Latham-Green, T.L. (2020), Understanding the social impact of participation in Driven Game Shooting in the UK, Doctoral Thesis, University of Northampton	Doctoral mixed-methods social-impact research	UK driven-game-shooting participants	Social capital, identity, mental wellbeing, physical activity and social networks associated with participation	Provides the primary wider evidence base behind the 2,424-response participant survey and qualitative research concerning wellbeing, identity, outdoor activity and social connection	Participant-based observational research rather than a random population sample. Associations do not establish that driven game shooting itself caused observed wellbeing or identity differences. Participants who choose the activity may differ systematically from non-participants	**Q29**
Latham-Green, T., Hazenberg, R. & Denny, S. (2021), "Examining the role of driven-game shooting as a psycho-social resource for older adults in rural areas: a mixed-methods study", Ageing & Society, 43(4), 902–928	Peer-reviewed mixed-methods social-science study	UK driven-game-shooting participants	Social capital, friendships, loneliness, identity and mental health and wellbeing	Provides peer-reviewed support for the social-impact findings. Reports a statistically significant positive association between participation and mental health and wellbeing across the 2,424-response dataset	Association rather than proof of causation. Participants were self-selected and the paper has a particular focus on older adults and rural wellbeing. Outdoor exercise, social interaction, pre-existing identity and other factors may contribute to observed effects	**Q29**
McMorran, R., Bryce, R. & Glass, J. (2015), Grouse shooting, moorland management and local communities: Community perceptions and socio-economic impacts of moorland management and grouse shooting in the Monadhliath and Angus Glens	Commissioned community survey / social research	Monadhliath and Angus Glens, Scotland	Community perceptions of grouse shooting, employment, local businesses and wider social effects	Provides comparative evidence that residents in the two study areas perceived community-level social and economic benefits from grouse shooting and associated management	Scottish case studies based substantially on reported perceptions. Results should not be assumed to represent all English upland communities, and reported benefits do not demonstrate that grouse shooting caused every observed community characteristic	**Q29**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Our Upland Living Heritage (2026), community-consent exercise supporting the Expression of Interest for "Community Grouse Conservation and Shooting" in the UK Inventories of Living Heritage, supported by the Moorland Association and partner organisations	Contemporary community-consent / experiential evidence	Upland communities and participants across the UK	Whether grouse conservation and shooting are recognised by a participating community as a continuing cultural practice involving shared skills, knowledge, traditions and identity	The exercise pre-dated the present Defra Call for Evidence and was designed to document community practice and consent rather than to respond to this regulatory process. Participants were asked to identify their role within the community and describe relevant traditions and practices. By 17 March 2026 more than 1,500 people had pledged support. "Community Grouse Conservation and Shooting" was subsequently listed in the official UK Living Heritage Expressions of Interest across England, Scotland, Wales and Northern Ireland. This provides contemporary evidence that a substantial community of participants itself attributes cultural and heritage significance to the activity.	Self-selecting community-consent exercise rather than a representative public-opinion survey. The number of supporters demonstrates the existence and scale of an engaged community of practice but cannot establish the proportion of upland residents or wider public who share those views. Listing as an Expression of Interest is not equivalent to formal acceptance or recognition on the final UK Inventory.	**Q29**
Moorland Association member evidence concerning red-grouse harvest, use and disposal	Organisational / practitioner evidence	MA membership / English and Welsh grouse moors	Practical experience of grouse harvest, routes into consumption and disposal	MA reports no evidence from members of a systemic disposal problem involving significant quantities of otherwise usable red grouse	Not a statistically representative national survey and no comprehensive quantitative dataset exists. Absence of reports to the MA does not establish that unnecessary waste never occurs	**Q25–27**
Game & Wildlife Conservation Trust National Gamebag Census and established grouse-counting practice	Long-running practitioner / monitoring datasets and methodologies	UK game management	Grouse population monitoring, breeding productivity and harvest records	Relevant to distinction between harvesting a naturally reproducing wild population and release-based systems, and to availability of voluntary population and bag data	Voluntary coverage is incomplete and may not represent every shoot or moor. MA does not rely upon it to provide a definitive national annual harvest figure	**Q25**
Appleton, H. & Smith, A. (2022), Sustaining ecosystems – English grouse moors, Game & Wildlife Conservation Trust, Fordingbridge	Sector-produced natural-capital evidence audit and policy analysis drawing on published scientific, government and practitioner evidence	English uplands / grouse-moor management	Contribution of grouse-moor management to environmental goods and services identified in Defra's 25 Year Environment Plan, including biodiversity, water, climate, wildfire and other environmental hazards; evidence gaps, management trade-offs and approaches to future delivery	Provides an earlier worked example of assessing grouse-moor management as a multi-functional land-management system rather than as a single pressure. The report structures evidence around upsides, downsides, challenges and opportunities and explicitly considers trade-offs between environmental outcomes. It also proposes moor-level environmental management plans, routine practitioner monitoring, collaborative delivery and adaptive rather than prescriptive management. The report records substantial peatland-restoration activity within grouse-managed landscapes, including approximately 7,000 km of historic drainage blocking and more than 27,000 ha of peatland restoration or re-vegetation, supporting the proposition that active grouse-moor management and peatland restoration are not necessarily mutually exclusive.	Produced by GWCT rather than an independent statutory or academic body and is primarily an evidence audit and policy framework rather than a peer-reviewed primary study. Individual ecological propositions should therefore be assessed against their underlying sources where material. Some quantitative figures, including restoration activity, rely partly on Moorland Association or practitioner reporting rather than independently audited national datasets. The report predates more recent evidence cited elsewhere in this response and should not be treated as superseding newer primary research.	**Q8, Q11, Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Game & Wildlife Conservation Trust (2020), Peatland Report 2020: A review of the environmental impacts including carbon sequestration, greenhouse gas emissions and wildfire on peatland in England associated with grouse moor management	Sector-produced secondary evidence review and policy analysis drawing on peer-reviewed research, government datasets, expert input and some MA spatial data	English upland peatlands / grouse-moor management	Peatland carbon stocks and fluxes; greenhouse-gas emissions; effects of vegetation management; pyrogenic carbon; wildfire; biodiversity; and evidence gaps relevant to peatland policy	Relevant to the treatment of carbon evidence in Q28(e). The review distinguishes carbon stock from carbon flux and highlights that conclusions can depend materially on the time horizon over which management effects are measured. It notes that much of the available upland carbon-flux evidence was based on a small number of sites and relatively short study periods; reports longer-term carbon-stock evidence showing peat and carbon accumulation under both burned and unburned wet blanket-bog treatments, with outcomes varying by management regime; and identifies pyrogenic carbon as a potentially long-lived carbon pathway not consistently incorporated into carbon assessments. Supports the MA's argument that comparisons between burning, cutting, grazing, rewetting and non-intervention should use comparable time horizons and, so far as possible, account for all material carbon gains and losses.	Produced by GWCT rather than an independent statutory or academic body and is a secondary review rather than a peer-reviewed primary study. Its conclusions reflect the evidence available in 2020 and should be considered alongside the newer evidence cited elsewhere in this response, including subsequent Natural England reviews and wildfire research. The report itself identifies substantial limitations in the underlying evidence, including small numbers of study sites, short study durations and incomplete carbon budgets. Evidence concerning pyrogenic carbon is relevant to completeness of carbon accounting but does not establish that prescribed burning necessarily produces a superior net carbon outcome.	**Q28(e)**
Langholm Moor Demonstration Project (2014), The Langholm Moor Demonstration Project: Seven Year Review – December 2014, Langholm Moor Demonstration Project Ltd, ISBN 978-1-901369-23-6	Multi-partner scientifically monitored demonstration-project review; partnership comprising Scottish Natural Heritage, Buccleuch Estates, Game & Wildlife Conservation Trust, RSPB and Natural England	Langholm–Newcastleton Hills SSSI/SPA, south-west Scotland; 11,960 ha project area	Effects and progress associated with restoration of grouse-moor management, including habitat condition, hen harriers and other raptors, red grouse, waders, black grouse, predator management and achievement of SPA/SSSI and sporting objectives	Provides a documented protected-site counterfactual. The review records that after grouse shooting became unviable and keepering largely ceased, fox and crow numbers increased, red grouse declined further, breeding waders fell to very low levels, hen harrier numbers fell from their earlier peak and the SSSI/SPA were found to be in unfavourable condition. Following restoration of active management, the project met its heather-habitat targets and by 2014 exceeded its hen-harrier target; merlin and black grouse also increased. Red grouse nevertheless remained below the level required for commercially viable driven shooting. Relevant to the MA's argument that different species and protected features can respond differently within the same management system and that the counterfactual to changing grouse-moor management should be assessed explicitly.	The project itself states that it was a scientifically monitored demonstration project, not a controlled experiment. Multiple management and ecological factors changed over time, including habitat restoration, grazing, legal predator control and natural variation in prey and weather. The reported associations should therefore not be interpreted as demonstrating that grouse-moor management alone caused each observed change. Later peer-reviewed studies, including Ludwig, Roos & Baines (2019), should be used for specific species-response conclusions where available.	**Q9, Q12, Q21**

Grouse Moor Management Review Group (2019), Grouse Moor Management Review Group: Report to the Scottish Government, November 2019	Independent expert review commissioned by the Scottish Government, drawing on published research, statutory and NGO evidence, stakeholder submissions, questionnaire responses, oral evidence and field visits	Scotland / grouse-moor management and regulation	Environmental impacts and regulation of grouse-moor management, including evidence gaps, regulatory options, Codes of Practice, training, accreditation, illegal killing of raptors, bird-of-prey crime and predation, muirburn, Mountain Hares, medicated grit and wildfire	Provides independent evidence relevant to the treatment of uncertainty, the design of proportionate regulation, interpretation of wildlife-crime evidence and assessment of wildfire and vegetation management. The Group identified significant evidence gaps and contested science and considered a range of regulatory mechanisms rather than licensing alone. It stated that regulation should be transparent, accountable, consistent, proportionate, accessible, effective and targeted only where needed, and identified accreditation as a means of rewarding good behaviour. It recommended training and refresher courses for land managers to support compliance with Codes of Practice and development of an accreditation scheme following consultation with the grouse-shooting sector. In relation to illegal raptor killing, the Group recognised both that recorded incidents were unlikely to capture the full scale of illegal killing and that repeated satellite-tag disappearances could contribute to wider evidence of illegal killing, while distinguishing such inference from proof sufficient to establish an individual criminal offence. On wildfire, it identified increasing risk under climate change, recognised that prescribed burning can create risk if it escapes but can also	Scottish rather than English policy context and published in 2019, so subsequent evidence, legislation and regulatory developments must also be considered. The report is an expert review rather than a primary experimental study. Its recommendations on accreditation and regulatory design do not themselves demonstrate that those measures have produced biodiversity outcomes. Its conclusion that repeated satellite-tag disappearances were insufficient for criminal prosecution concerns proof of an individual offence and should not be interpreted as meaning that such disappearances have no evidential value at population or spatial level. The Group considered there to be substantial evidence of illegal raptor killing and recommended additional statutory regulation in several areas and a conditional route to licensing of grouse shooting; its findings should therefore be represented in their full context. Its wildfire assessment reflects the evidence available in 2019 and should not substitute for the more recent Natural England reviews and empirical wildfire research cited separately in this response.	**Q8, Q11, Q20, Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
				potentially reduce fuel loads and create firebreaks, identified possible roles for cutting and grazing, and recorded important uncertainty over how those interventions should best be combined. It also noted that burning and cutting are not operationally interchangeable on all sites.		
NPCC / National Wildlife Crime Unit correspondence with the Moorland Association (2024–26); Wildlife Crime Tactical Delivery Group Terms of Reference (2025); Bird of Prey Crime 4P Plan – NGO accountabilities	Official policing correspondence, operational governance documents and partnership framework	UK wildlife-crime policing / bird-of-prey crime	Classification and communication of wildlife-crime information; information supplied to Government; prevention and partnership arrangements; training, intelligence-sharing, crime reporting and best practice	Police correspondence confirms that the NWCU reports quarterly to Defra and that work of the satellite-tagged bird-of-prey taskforce could form part of a police response to a Defra consultation on gamebird shooting. The 4P Plan and TDG Terms of Reference provide official policing support for practices including prompt crime reporting and intelligence-sharing, use of police crime-recording standards, training, collaborative problem-solving, promotion of best practice and targeted prevention. Relevant to the MA's request that evidence supplied for policy purposes distinguishes confirmed offences, suspected incidents, intelligence, statistical inference and unexplained events, and to Q21's consideration of mechanisms intended to reduce wildlife-crime risk.	Operational and governance material rather than scientific evidence measuring the incidence of bird-of-prey crime or experimentally testing the effectiveness of particular interventions. Some information is legitimately constrained by live-investigation and intelligence sensitivities. Correspondence between the MA and police also records disputed matters and should not itself be treated as establishing the incidence or cause of wildlife crime. The 4P Plan and TDG framework identify intended approaches to prevention and partnership working but do not demonstrate that each intervention has produced a quantified reduction in offending.	**Q20–21**
Harrison, M. (2026), “Protecting the Wild: The work of the UK National Wildlife Crime Unit and the challenges of securing justice”, Magistrate, Autumn 2026, pp. 36–38	Public-facing practitioner commentary by a serving NWCU Detective Inspector	UK wildlife-crime investigation, prosecution and sentencing	The NWCU’s role; difficulties caused by delayed discovery and causation; reliance on specialist ecological, veterinary and forensic evidence; licensing complexity; and the treatment and sentencing of wildlife offences	Supports the MA’s request that Defra distinguish intelligence, suspicion and unexplained events from recorded crimes and offences established by evidence. The article itself acknowledges that evidential sufficiency may depend upon specialist evidence and nuanced questions about whether a licence existed or was breached	Explanatory and advocacy commentary rather than a technical report or primary study. It provides no underlying data and does not quantify offending, test hotspot designations or establish the prevalence of organised criminality. It represents the published account of its author and should not automatically be treated as a formal NWCU evidential assessment	**Q20**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
RSPB (2020), AGM statement on review of our gamebird shooting policy, 10 October 2020; and RSPB (2020), Gamebird Shooting Policy Review – Q&As, updated 17 December 2020	Organisational policy review, stakeholder-consultation material and interpretation of existing evidence; not primary scientific research	UK gamebird shooting, with specific reference to driven grouse shooting and the Langholm Moor Demonstration Project in south-west Scotland	RSPB assessment of environmental impacts of gamebird shooting and associated land management; conservation benefits and risks; interpretation of Langholm; predator management; hen-harrier conservation; proposed regulatory reform	Relevant because the RSPB's review did not characterise all shooting-related land management as environmentally harmful. Its AGM statement acknowledged that land well managed for shooting can provide considerable wildlife benefits and that the RSPB had common ground with well-managed shoots. In the accompanying Q&A, the RSPB stated that its participation in Langholm showed that wider public benefits from grouse-moor management could be compatible with shooting of "modest grouse bags", and described diversionary feeding of hen harriers as a legal and highly successful approach which helped deliver the productive hen-harrier population required to meet SPA obligations. This provides independent corroboration that conservation and wider public benefits can coexist with some grouse shooting and supports the MA's argument that impacts should be assessed by management practice and outcome rather than assigning a single biodiversity effect to grouse shooting as a whole.	These documents set out the RSPB's organisational interpretation and policy position rather than new experimental or peer-reviewed evidence. They should not substitute for the underlying Langholm project reports or subsequent peer-reviewed studies. The RSPB simultaneously concluded that some forms and intensities of gamebird shooting caused environmental harm and advocated licensing of driven grouse shooting, tighter regulation and other reforms. The material should therefore be represented in that full context rather than as evidence that the RSPB endorsed existing grouse-moor management generally. Published in 2020, it also predates later research and policy developments cited elsewhere in this response.	**Q12, Q21**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Denny, S. (2025), Conserving Birds and Nature in Wales: Land Management Regimes and Taxpayers' Money, Regional Moorland Groups	Commissioned mixed-methods case-study and evidence review, combining literature review, documentary analysis, repeated site visits and qualitative interviews with land managers, conservation practitioners and other stakeholders	Wales, with particular focus on the RSPB-managed Lake Vyrnwy reserve and the Berwyn SSSI/SPA/SAC; comparative consideration of other Welsh land-management regimes	Long-term upland land management, protected-site objectives, bird-population outcomes, grazing, predator management, peatland restoration, vegetation management, wildfire resilience and the relative performance of different management regimes	Provides a relevant protected-site comparator showing that long-term conservation-led management can produce mixed outcomes across habitats and species. Drawing substantially on RSPB management plans and monitoring information, the report records significant habitat-restoration activity and positive responses for some species, while other priority species, including curlew and black grouse, remained substantially below earlier abundance or management-plan targets. This supports the MA's argument that protected-site condition and species trends should be attributed to particular pressures and management mechanisms rather than assumed to result from a particular land-use label. The report also provides operational evidence from Lake Vyrnwy that peatland rewetting is being combined with active surface-vegetation management: mowing has been used to reduce potential fuel load as well as create varied vegetation structure, while rewetting, mowing and managed grazing are all expected to contribute to wildfire-risk reduction. This supports consideration of hydrological restoration and fuel management as potentially complementary interventions rather than automatic alternatives.	Commissioned by Regional Moorland Groups and not a peer-reviewed primary ecological study; the contents and conclusions are the responsibility of the author. The report combines secondary evidence with interviews and case-study material, so individual ecological propositions should be traced to the underlying monitoring data or primary sources where material. Lake Vyrnwy is subject to multiple management influences and constraints, including the RSPB, landowners, water interests, statutory bodies, grazing, forestry and historical management change; observed species trends therefore do not demonstrate that RSPB management caused either declines or improvements. The wildfire material is operational case-study evidence and records management expectations and practice rather than measured effects on wildfire probability, size or severity. Welsh findings should not automatically be assumed to transfer directly to English uplands.	**Q14, Q28(e)**
Defra (2023), Independent Review of Protected Site Management on Dartmoor (Fursdon Review), particularly paras 4.2–4.5 and 16.1–16.5	Independent Defra-commissioned review drawing on stakeholder evidence, field visits and expert panel assessment	Dartmoor, England; upland protected sites, principally SSSIs and SAC	Protected-site condition, adequacy of monitoring and baselines, attribution of ecological change, changing environmental pressures and the management of SSSIs	Provides independent support for distinguishing condition from causation. The review found incomplete historic monitoring, uncertainty about whether SSSIs were favourable when notified or their subsequent trajectory, unresolved causal relationships and a need for proper data capture, suitable baselines and scientific evaluation alongside condition assessment. It also cautioned that changing environmental conditions may make some historic management targets unattainable and against irreversible responses where ecological effects remain uncertain	Dartmoor differs ecologically and institutionally from grouse moors elsewhere in England and the review did not assess the effects of grouse shooting. Its relevance is methodological rather than evidence that the same causes operate on other protected uplands. It should therefore not be used to infer the cause of SSSI condition on grouse moors, but to demonstrate the limitations of condition status alone as evidence of causation	**Q11, Q14**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Office for Environmental Protection (2026), Progress in improving the natural environment in England 2024/2025, Chapter 9: Reduced risk of harm from environmental hazards, pp. 177–181	Independent statutory assessment of Government progress under the Environment Act 2021, drawing on Government reporting and wider evidence	England; national environmental policy and climate-adaptation context	Wildfire risk and resilience; adequacy of evidence, targets, coordination, policy development and adaptation measures	Provides independent support for treating wildfire resilience as a distinct and incompletely evidenced environmental outcome. The OEP states that assessing progress is difficult because clear long-term targets are lacking and that "resilience to wildfires in England is largely unevidenced". It records limited coordination between land managers and emergency services, inconsistent treatment of wildfire risk in local planning, and stalled progress on the Wildfire Strategy and Action Plan. This supports the MA's case that Defra should distinguish measured wildfire outcomes from intermediate indicators or proxies and should assess hydrology, vegetation/fuel management, prevention, access and response capability separately rather than assuming that any single intervention demonstrates overall wildfire resilience	The report is a national policy/progress assessment, not a primary experimental study of grouse-moor management or individual vegetation-management techniques. It also recognises peatland restoration as relevant to wildfire resilience. It should therefore be used to demonstrate the present evidence and policy gap, not as evidence that restoration is ineffective or that prescribed burning is necessarily the preferred intervention	**Q28(e)**
IDEAL UK FIRE, Toward Informed Decisions on Ecologically Adaptive Land Management for Mitigating UK FIRE, Case for Support	Interdisciplinary research programme / research proposal involving UK universities and a wide stakeholder partnership including Government, statutory bodies, conservation organisations, utilities and land managers	UK fire-prone landscapes, including heathland, peatland, grassland and related upland and lowland systems	Comparative effects of wildfire-management tools on wildfire risk, carbon balance, biodiversity and habitat condition across different spatial and temporal scales; approaches include traditional and prescribed burning, mowing, managed succession and rewetting	Demonstrates that important questions about the relative costs, benefits and trade-offs of wildfire-management interventions remain unresolved and are the subject of active research. The project identifies "major uncertainties" and a limited and sometimes conflicting evidence base, and is designed to test whether different fuel-management interventions reduce landscape-scale wildfire spread, how short-term impacts compare with medium- and long-term outcomes, and how different interventions or combinations affect carbon and biodiversity. It also recognises that limited or no management may itself expose landscapes to severe episodic wildfire impacts. Supports the MA's case for site-specific, adaptive management and against assuming that any single intervention or proxy demonstrates overall wildfire resilience	This is a research programme rather than completed research, so its research questions are evidence of recognised uncertainty, not evidence that any particular intervention is effective or ineffective. It should not be cited as proof that burning reduces wildfire spread, that rewetting is insufficient, or that any one management tool is preferable. Its value is in demonstrating the acknowledged evidence gaps, need for comparative testing and importance of landscape-specific trade-offs. The document also involves MA and sector stakeholders, so it should be presented transparently as a collaborative research programme rather than as independent evidence of grouse-moor outcomes	**Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Carroll, J.P., Fuller, R.A. & McGowan, P.J.K. (eds) (2000), Partridges, Quails, Francolins, Snowcocks, Guineafowl and Turkeys: Status Survey and Conservation Action Plan 2000–2004, IUCN/SSC and World Pheasant Association	IUCN Species Survival Commission conservation action plan / international expert synthesis	Global; ground-dwelling gamebirds other than grouse, including partridges and quails	Conservation status and management of wild gamebird populations, including hunting, sustainable use, monitoring and habitat conservation	Provides international conservation precedent for treating harvest of wild gamebirds as a question of sustainability rather than harvest per se. The Action Plan recognises that hunting mortality does not necessarily cause long-term population decline where losses are sustainable, but stresses that sustainable-use programmes require population monitoring and management informed by population status. Relevant to the MA's distinction between the monitored harvest of a naturally reproducing wild population and systems based on rearing and release, and to the proposition that harvest should be adjusted according to biological evidence rather than assumed to be inherently sustainable or unsustainable.	Published in 2000 and prepared principally from evidence available in the late 1990s. It does not cover grouse directly and should not be used as evidence of the current status, productivity or sustainable harvest level of English red grouse. Its relevance is principally the general conservation-management principle that wild-gamebird harvest should be monitored and demonstrably sustainable. More recent species-specific and UK evidence should determine present-day conclusions	**Q25**
Storch, I. (ed.) (2007), Grouse: Status Survey and Conservation Action Plan 2006–2010, IUCN Species Survival Commission / WPA-BirdLife-SSC Grouse Specialist Group	IUCN SSC species-group conservation action plan / international expert synthesis	Global grouse populations, including British red grouse (Lagopus lagopus scoticus)	Status, threats, hunting, habitat management and conservation requirements of the world's grouse species	Provides grouse-specific international conservation context for the management and sustainable harvest of wild grouse populations. The Action Plan includes British red grouse within its assessment and treats hunting as an established ecological, cultural and socio-economic feature across parts of the grouse range. It supports the principle that exploitation of wild grouse populations should be informed by population status and monitoring rather than by a predetermined harvest. It also provides historical independent recognition of the longstanding cultural and management significance of grouse hunting in Britain.	Published in 2007 and intended as a conservation action plan for 2006–10. It should not be relied upon for current red-grouse abundance, present harvest levels, current conservation status or proof that contemporary driven grouse shooting is sustainable. Its value is principally in the enduring management principles and historical context it records; present-day sustainability must be established using current population, harvest and ecological evidence	**Q25, Q29**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Council of Europe (2007), European Charter on Hunting and Biodiversity, Bern Convention; together with IUCN World Conservation Congress Resolution 4.026 (2008)	International conservation-policy / good-practice framework for sustainable hunting; subsequently welcomed and promoted through an IUCN World Conservation Congress resolution	Europe; hunting of wild birds and terrestrial mammals and its relationship with biodiversity conservation	Sustainable harvest; adaptive management; regulation; population and harvest monitoring; stakeholder participation; habitat conservation; responsible use of harvested wildlife; waste avoidance; cultural and social dimensions of hunting	Provides a directly relevant international good-practice framework for assessing sustainable hunting. Principle 3 requires harvest to be ecologically sustainable and links sustainable use to reliable science, local knowledge and adaptive management. The Charter also advocates understandable and proportionate regulation, stakeholder involvement, healthy habitats for harvestable populations, responsible utilisation of harvested wildlife and avoidance of waste; Principle 7 specifically requires that harvest be properly utilised and wastage avoided. This supports the MA's propositions that regulation, monitoring, practitioner responsibility and adaptive management should operate together; that harvest of wild red grouse should respond to population evidence; and that usable harvested birds should be treated as a food resource rather than unnecessarily discarded. IUCN subsequently identified the Charter as specific guidance on hunting and conservation and requested its members to promote it.	A non-binding good-practice framework, not primary ecological evidence and not specific to English red grouse. It does not demonstrate that current grouse shooting satisfies its sustainability criteria; that question requires evidence of population status, harvest, implementation and environmental outcomes. Nor does the Charter argue against regulation: regulation is integral to its sustainable-use framework. It should therefore be used as a benchmark for good governance and sustainable harvest, not as proof that additional regulation is unnecessary	**Q10, Q27**
Thompson, P.S. & Wilson, J.D. (2020), A review of recent evidence on the environmental impacts of grouse moor management, RSPB	RSPB evidence review / secondary synthesis of published scientific literature	Principally UK uplands, especially England and Scotland; driven grouse-moor management	Environmental effects of grouse-moor management, including vegetation burning and wildfire, predator control, disease management, biodiversity, cultural/economic context and identified knowledge gaps	Relevant because the RSPB review itself recognises that grouse-moor management does not produce a single uniform environmental outcome. It records that, in the absence of illegal raptor killing, management at Langholm was associated with benefits for hen harrier, curlew, golden plover and snipe, while also identifying substantial negative impacts associated with other practices. It is also important to the wildfire evidence because the review describes the science concerning managed burning as complex and contested and states that further evidence was required to determine the relative roles of managed burning, fuel reduction and peatland rewetting in mitigating wildfire risk and severity. The report is additionally relevant to interpretation of Langholm because its later statement that smaller grouse bags "would have been sustainable" should be distinguished from the project's predetermined driven-shooting viability objective, which was not achieved.	Produced by the RSPB as part of its policy review rather than as an independent systematic review, and it reflects the evidence available in 2020. The RSPB advocated statutory licensing and identified numerous environmental harms associated with intensive driven grouse management; those conclusions should be represented alongside the qualifications on which the MA relies. Its statements about what might have been sustainably shot at Langholm are retrospective interpretations rather than observed project outcomes and should not be substituted for the demonstration project's agreed success criteria. More recent evidence, including Natural England reviews and 2026 wildfire research, should take precedence where it updates the science	**Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Rayment, M. (2022), Driven grouse shooting: Assessing the economic and social impacts of future options for grouse moor management, report commissioned by the RSPB	Independent consultant report commissioned by the RSPB; evidence review, stakeholder consultation, seven case studies and policy-option appraisal	Great Britain; driven and walked-up grouse shooting and alternative grouse-moor policy scenarios	Economic, social and environmental consequences of grouse-moor management and three policy scenarios: business as usual, licensing and a ban on driven grouse shooting	Relevant to the MA's requirement that policy appraisal considers the counterfactual rather than only the activity being regulated. The report anticipates that policy change could alter land use, employment, predator and vegetation management, biodiversity and ecosystem-service outcomes, with effects varying between places. It also demonstrates that walked-up and driven grouse shooting are materially different management and financial models: driven shooting generates substantially higher revenues and normally supports more intensive management, while a change in management model may alter staffing and associated environmental and social outputs. The report separately recognises that grouse moors can support rural communities, cultural heritage and community identity. It therefore supports Defra assessing what management regime would actually replace existing driven-grouse management rather than assuming that its present outputs would continue unchanged under a lower-intensity alternative.	Commissioned by the RSPB, although the report expressly states that Matt Rayment prepared it as an independent consultant and that its analysis and findings do not represent RSPB policy. Much of the policy-option analysis is scenario-based and depends on assumptions about behavioural responses, future land use, licensing conditions and alternative investment. It should therefore not be used as proof that licensing, a ban or a transition to walked-up shooting would necessarily produce any particular outcome. Its value is in demonstrating the range of consequences and counterfactuals that require assessment. Economic and employment estimates are also subject to acknowledged data gaps and uncertainty	**Q8, Q29**
Thompson, P.S., Douglas, D.J.T., Hoccom, D.G., Knott, J., Roos, S. & Wilson, J.D. (2016), "Environmental impacts of high-output driven shooting of Red Grouse Lagopus lagopus scotica", Ibis, 158, 446–452, DOI: 10.1111/ibi.12356	Journal-published Viewpoint and narrative synthesis of published evidence	UK uplands / high-output driven grouse shooting and associated management	Environmental benefits, adverse impacts and societal costs associated with intensive grouse-moor management, including predator control, vegetation burning, disease management and regulation	Provides one interpretation of the available evidence. The authors acknowledged benefits for heather moorland and some ground-nesting birds but concluded that there was growing evidence of negative environmental impacts and societal costs. Its subsequent publication, including its sources and reasoning, enabled its evidential selection and interpretation to be scrutinised and challenged	Written by RSPB scientists and presented as a Viewpoint rather than primary research or a systematic review. It does not report a formal search strategy, predetermined inclusion and exclusion criteria or structured quality assessment. It combines consideration of published evidence with interpretation and policy conclusions. It reflects the evidence available in 2016 and should be considered alongside subsequent research and contrary or qualifying evidence	**Q8**
Sotherton, N.W., Baines, D. & Aebischer, N.J. (2017), "An alternative view of moorland management for Red Grouse Lagopus lagopus scotica", Ibis, 159, 693–698, DOI: 10.1111/ibi.12489	Journal-published response Viewpoint and narrative synthesis of published evidence	UK uplands / driven grouse shooting and associated moorland management	Reassessment of the evidence and conclusions presented by Thompson et al. (2016), including additional published studies, contrary findings, positive outcomes and areas of uncertainty	Demonstrates that authors may accept many individual observations and acknowledge published evidence of damage while reaching a materially different overall assessment when additional evidence, conflicting findings and uncertainty are included or weighted differently. The exchange provides a practical illustration of why Defra should publish its evidence base, inclusion and weighting decisions and analytical reasoning so that its conclusions can be tested against omitted or contrary evidence	Written by GWCT scientists and reflects a sector-linked institutional perspective. It is a narrative response rather than primary research, an independent replication or a systematic review, and does not report a formal search protocol or structured quality assessment. Its additional references and interpretations should themselves be assessed against the underlying studies. Neither this article nor Thompson et al. should be treated as providing a definitive synthesis of the evidence	**Q8**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Department for Environment, Food and Rural Affairs (2026), Future of Rural England Report, published 16 July 2026	Government policy report informed by official statistics, stakeholder evidence and cross-government workshops	Rural England; cross-government policy	Rural proofing; rural economic resilience; SMEs; traditional skills; community resilience; rural crime; monitoring and accountability	Supports the MA's position that rural impacts should be considered from the outset of policy development and assessed through published metrics. Its recognition that rural crime, including wildlife offences, is under-reported and poorly understood supports the need for better data, coordinated policing and a common authoritative evidence base distinguishing confirmed offences, suspected offences, intelligence and unexplained incidents.	Does not examine grouse shooting, grouse-moor management or licensing specifically. Does not quantify impacts attributable to the sector or provide a gamebird-specific crime dataset. It is relied upon as an authoritative statement of Defra's policy commitments and recognition of evidential deficiencies, rather than as primary evidence of the effects of grouse shooting.	**Q20, Q28(e), Q29**
Robertson, P.A., Park, K.J. & Barton, A.F. (2001), "Loss of heather Calluna vulgaris moorland in the Scottish uplands: the role of red grouse Lagopus lagopus scoticus management", Wildlife Biology, 7, 37–42, DOI: 10.2981/wlb.2001.004	Peer-reviewed longitudinal observational study	Scottish uplands; land-cover change at 229 National Countryside Monitoring Scheme sites between the 1940s and 1980s	Changes in heather, woodland and other upland land cover in areas retaining grouse management compared with areas where grouse management ceased. Sites retaining grouse management lost an average of approximately 24% of heather cover, compared with approximately 41% where management had ceased; woodland expansion was also greater following cessation	Provides quantified evidence relevant to the land-use counterfactual. It demonstrates that the cessation of grouse management was associated historically with materially different habitat outcomes, including greater loss of heather and conversion to woodland or other vegetation. Supports the need for Defra to assess the likely replacement land use and its ecological consequences rather than assuming that existing habitat and management outcomes would remain unchanged	Observational rather than experimental evidence; association does not establish that cessation of grouse management alone caused the differences. The study concerns Scotland, historic change between the 1940s and 1980s, and policy conditions—including agricultural and forestry incentives—which may differ from England today. Heather retention is a habitat outcome and does not by itself demonstrate the response of individual species. The authors noted, however, that the compared groups did not differ significantly in land-cover composition at the initial 1940s baseline	**Q9**
Tharme, A.P., Green, R.E., Baines, D., Bainbridge, I.P. & O'Brien, M. (2001), "The effect of management for red grouse shooting on the population density of breeding birds on heather-dominated moorland", Journal of Applied Ecology, 38, 439–457.	Peer-reviewed, large-scale comparative observational study. The authors included four researchers affiliated with the RSPB and one with the Game Conservancy Trust.	320 one-kilometre squares on 122 estates in eastern Scotland and northern England.	Compared the densities of 11 breeding-bird species on heather-dominated moorland managed for red grouse shooting with those on otherwise comparable moorland. Golden plover and lapwing densities were approximately five times higher, and red grouse and curlew densities approximately twice as high, on grouse moors.	Provides important landscape-scale evidence that grouse-moor management can be associated with substantially higher densities of some species of conservation concern. Its collaborative authorship also demonstrates that evidence originating partly from an organisation critical of aspects of grouse shooting can nevertheless identify positive ecological associations. It supports assessment by species and management practice rather than treating all effects of grouse management as uniformly positive or negative.	Observational association does not by itself demonstrate causation. The study could not isolate the separate effects of predator control, vegetation management and other estate practices, and residual differences between sites may have contributed to the results. The surveys are now relatively old, and the findings were not positive for every species examined.	**Q9**
Roos, S., Smart, J., Gibbons, D.W. & Wilson, J.D. (2018), "A review of predation as a limiting factor for bird populations in mesopredator-rich landscapes: a case study of the UK", Biological Reviews, 93, 1915–1937; see also the 2022 corrigendum.	Peer-reviewed systematic review and evidence synthesis.	UK bird populations, considered in the context of the relatively high abundance of generalist predators in UK landscapes.	Examined predator trends and the evidence that predation limits bird populations. It found the strongest evidence of population-level limitation among ground-nesting seabirds, waders and gamebirds, while evidence was weaker or less consistent for a number of other groups.	Supports the proposition that predation can be a population-level constraint for some ground-nesting species and that lawful predator management may therefore have conservation relevance. It reinforces the need for Defra to assess what happens to predator-management capacity if grouse-moor management is reduced or displaced.	This is a UK-wide review, not a direct evaluation of grouse-moor management. Evidence strength varied considerably among species and studies. It does not establish that predator control is necessary, effective or proportionate in every location, and habitat condition and other pressures remain important. The corrected journal record should be used.	**Q9**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Game & Wildlife Conservation Trust (2019), The Moorland Balance: The Science Behind Grouse Shooting and Moorland Management, 2nd ed., written by Jennifer Brewin and edited by Dave Baines, Joe Dimbleby, Nick Hesford, Sonja Ludwig, David Newborn, Jonathan Reynolds, Adam Smith and Sian Whitehead. Game & Wildlife Conservation Trading Ltd, ISBN 978-1-901369-33-5.	Sector-produced scientific synthesis and evidence map, drawing together primary studies and other published material across multiple topics.	British uplands, including evidence from England and Scotland.	Reviews evidence relating to biodiversity, burning, peat formation, carbon, water, wildfire, rewetting, disease and predator management, raptors, mountain hares, alternative land uses and moorland economics.	Provides Defra with a consolidated route into a substantial body of scientific literature and identifies competing findings, management trade-offs and important counterfactual questions. It is particularly useful as an evidence map from which Defra can identify and appraise the underlying primary studies, including evidence that may not appear in narrower reviews.	It is a narrative synthesis produced by an organisation with an institutional interest in game and wildlife management, rather than an independently conducted systematic review. Selection and interpretation of evidence should therefore be tested against the underlying studies and other reviews. It was published in 2019, so Defra must also incorporate subsequent research and policy developments. It should not be treated as primary evidence for every proposition it reports.	**Q8**
Marrs, R.H. et al. (2019), “Experimental evidence for sustained carbon sequestration in fire-managed, peat moorlands”, Nature Geoscience, 12, 108–112.	Peer-reviewed analysis of a long-term, replicated burning experiment.	Hard Hill experimental plots, Moor House National Nature Reserve, northern England. The plots had experienced different burning frequencies over several decades.	Examined long-term peat and carbon accumulation under unburned and periodically burned treatments. Peat and carbon accumulated under all treatments, although accumulation was significantly reduced under the most frequently burned treatment. The study also reported effects on vegetation composition and diversity.	Demonstrates that the relationship between managed burning and peat carbon is not adequately represented by a simple assumption that any burning necessarily prevents carbon accumulation. Supports distinguishing burning frequency, site condition and measured outcome, and considering long time horizons when assessing effects.	Evidence comes from one long-running experiment on a particular, historically degraded and gullied, Calluna-dominated site. It does not establish that burning is beneficial or appropriate across all peatlands, nor does peat-core carbon accumulation alone represent the complete greenhouse-gas balance. The wider transferability and interpretation of the results were challenged by Baird et al.	**Q28**
National Police Chiefs' Council (17 September 2026), FOI response 3132/2026, Raptor-persecution hotspot methodology and validation	Official NPCC Freedom of Information response	England / national wildlife-crime policing	Recorded methodology for identification of raptor-persecution hotspots and selection of estates; classification of different forms of evidence; validation/approval arrangements	Confirms that recorded NWCU definitions and methodology exist and distinguish confirmed offences, suspected/reported incidents, intelligence and satellite-tag disappearances. Also records that NPCC does not hold specific guidance relating to validation/approval of hotspot designations, instead referring to wider policing requirements including CPIA and MoPI. Relevant to the evidential provenance and assurance of wildlife-crime information potentially supplied to Defra	Detailed methodology was withheld under FOIA s31 on law-enforcement grounds. The response does not demonstrate that hotspot assessments are unvalidated; it states that no specific guidance concerning validation/approval is held and that wider policing guidance applies. It should therefore not be used to infer the adequacy or inadequacy of individual hotspot assessments	**Q20–21**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Ashby, M.A. (2020), The Effects of Managed Burning on Upland Peatland Biodiversity, Carbon and Water: A Review of the Post-Glaves et al. (2013) Evidence, including independent peer-review evidence statement by Dr Gavin Stewart	Evidence review of post-2013 research, with independent scientific peer review	UK upland peatlands / managed burning	Effects of managed burning on upland peatland biodiversity, carbon and water; quality and certainty of the underlying evidence; implications for policy, practice and future research	Relevant to the MA's argument that the peatland-burning evidence base contains substantial uncertainty and that policy should distinguish between well-supported findings and questions which remain unresolved. Stewart's independent peer-review statement identified difficulties arising from studies measuring different outcomes at different spatial and temporal scales, inconsistency between studies and risks of confounding and inappropriate causal attribution. It also identified adaptive management—different management approaches applied at appropriate sites and monitored for outcomes—as a possible response to uncertainty, rather than reliance on a single management prescription.	Secondary evidence review rather than a new primary experiment. The review covered literature available up to 2020 and should therefore be read alongside subsequent research. Stewart did not conclude that precaution was inappropriate: his evidence statement identified precautionary management as potentially appropriate on high-value sites and deeper peat where hydrological functioning is intact or readily restored, while identifying adaptive management as an alternative approach in other circumstances. The findings therefore support differentiated, evidence-led management rather than demonstrating that prescribed burning is appropriate on every peatland site.	**Q28(e)**
Wheeler, B., Eades, P., Tratt, R., Shaw, S. & King, L. (2023), Working towards the Development of Ecohydrological Guidelines for Blanket Bogs and Allied Minerotrophic Habitats (Phase 2), report to the Environment Agency	Environment Agency-commissioned technical / ecohydrological report	UK blanket bogs and associated peatland habitats	Ecohydrological variation between blanket-bog systems, including differences in water inputs, landscape position, slope, underlying geology and the capacity of sites to retain water	Relevant to the MA's argument that peatlands should not be treated as hydrologically uniform and that the same restoration intervention cannot be assumed to produce equivalent outcomes at every site. Supports consideration of site-specific hydrological potential when assessing rewetting, vegetation response and the appropriate combination of management measures. Helps explain why management and restoration should be adapted to the physical and hydrological characteristics of individual peatland systems rather than prescribed uniformly.	Technical report rather than a controlled experiment evaluating wildfire outcomes or comparing specific management interventions. It provides evidence about ecohydrological variation and site potential, not direct evidence that any particular burning, cutting or rewetting regime is superior. Its relevance to wildfire is therefore indirect: it supports the proposition that hydrological outcomes and vegetation responses may differ between sites, which should be considered alongside direct wildfire evidence.	**Q28(e)**
Whitehead, S.C., Aebischer, N.J. & Baines, D. (2026), "Vegetation responses to experimental prescribed burning and cutting of heather on blanket peat sites managed as grouse moors in northern England", Applied Vegetation Science, 29, e70066, pp. 1–15	Peer-reviewed, replicated Before-After-Control-Impact field experiment	Five blanket-peat sites managed for red grouse in the Pennine Hills, northern England	Effects over the first five years of prescribed burning, cutting with brash retained, cutting with brash removed and no-management controls on vegetation structure, heather, peat-forming vegetation and fuel loads	Provides recent primary evidence directly comparing prescribed burning and alternative cutting treatments. Management reduced heather cover and vegetation height relative to baseline and unmanaged controls and was associated with increases in Eriophorum vaginatum and Sphagnum. All management treatments reduced fuel loads, while retaining cut brash slowed Sphagnum recovery and was identified as potentially increasing wildfire-ignition risk. Particularly relevant because it post-dates NEER155 and therefore forms part of the evidence Defra should consider when comparing management alternatives.	Reports the first five years following management and the authors expressly identify a need for longer-term research. Conducted on five northern-English grouse-moor sites and should not automatically be extrapolated to all peatlands. Cutting produced broadly comparable vegetation outcomes to burning in the study, so the paper should not be presented as demonstrating that burning is generally superior to cutting. The reported wildfire implication of retained brash concerns potential ignition risk rather than direct measurement of landscape-scale wildfire occurrence, spread or severity.	**Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Baker, S.J., Belcher, C.M., Vitali, R., Little, K., Doerr, S.H. & Kettridge, N. (2026), "Assessing soil heating beneath prescribed burns undertaken by teams according to the first UK vegetation fire standards", International Journal of Wildland Fire, 35(3), WF25224, DOI 10.1071/WF25224	Peer-reviewed primary field research	Eight prescribed burns across UK upland and lowland heath/moorland sites, including organic-rich peaty and mineral soils	Direct measurement of soil and above-ground temperatures and fire severity during prescribed burns carried out by trained teams in accordance with current guidance	Provides recent direct evidence concerning one specific mechanism by which prescribed burning may affect peatland carbon: heating of the underlying soil. Across the eight burns studied, organic-rich and mineral soils experienced limited heating; mean maximum soil temperatures were below 43.4°C and fire-severity assessments recorded no below-ground organic-matter loss. Supports the need to distinguish the effects of well-planned prescribed burning from those of uncontrolled wildfire and to assess individual causal mechanisms rather than transferring evidence between materially different fire types.	Eight burns conducted under mild weather conditions by trained teams following prescribed-burning guidance; results should not be extrapolated to poorly conducted burns, different weather/fuel conditions or all peatland settings. The study measured direct soil heating and below-ground organic-matter loss during the burns, not the complete carbon balance, biodiversity effects or long-term consequences of repeated management. It therefore addresses a specific pathway rather than demonstrating that prescribed burning has no wider environmental impacts.	**Q10, Q13, Q15, Q28(e)**
Heinemeyer, A., Ashby, M.A., Liu, B., Mycroft, A., Burn, W.L., Holmes, T., Lloyd Jones, A. & Andrews, L.O. (2025b), "Prescribed heather burning on peatlands: A review of ten key claims made about heather management impacts and implications for future UK policy", Mires and Peat, 32, Article 12, DOI 10.19189/001c.143335	Peer-reviewed critical evidence review	UK heather-dominated peatlands / prescribed burning and alternative peatland-management approaches	Reviews the evidence underlying ten commonly made propositions concerning prescribed burning, peatland carbon, Sphagnum, hydrology, wildfire, water and biodiversity, and considers implications for evidence synthesis and policy	Relevant to the MA's argument that evidence concerning peatland management remains contested and context-dependent and that Defra should examine the strength, limitations and applicability of underlying studies rather than treating the conclusions of any one evidence synthesis as determinative. The authors emphasise site-specific and pre-management differences, temporal and spatial scale, confounding and the need to compare burning robustly with alternative management scenarios. They also specifically question aspects of recent evidence reviews used to inform policy.	Review paper rather than new experimental evidence and represents the authors' critical interpretation of a contested literature. Its criticisms of other reviews, including Natural England material, should not themselves be treated as demonstrating that those reviews are incorrect. Individual propositions should be checked against the underlying studies and contrary evidence.	**Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
North Yorkshire Local Resilience Forum (2026), Report to the Fylingdales Moor Fire 2025: Part 1 – Response	Official multi-agency incident / debrief report	North York Moors, England; major 2025 upland wildfire	Scale, duration and environmental consequences of severe wildfire; critical-infrastructure risk; emergency-response capability; firebreaks and operational surface-fuel management	Demonstrates the potentially substantial environmental, operational, public-safety and critical-infrastructure consequences of severe upland wildfire. Records initial University of Exeter analysis estimating 54,258 tonnes CO_2e from direct peat-soil combustion. Also provides operational evidence that vegetation and fuel continuity were material to wildfire containment: Wildfire Tactical Advisors informed a hybrid firebreak approach involving surface-fuel separation to reduce surface-fire spread, while sections adjoining an existing fire track were cut to maximise separation between fuels. Supports the MA's case that wildfire assessment should distinguish hydrological condition from above-ground fuel management and consider firebreaks, access and response capability alongside restoration.	Incident/debrief evidence rather than an experimental comparison of land-management regimes. Does not establish that prescribed burning, cutting or any other preventative management intervention would have prevented or reduced the fire. The fire occurred during exceptionally warm, dry conditions and response was materially complicated by unexploded ordnance. The fire subsequently breached an existing strengthened firebreak, demonstrating that fuel separation and firebreaks are risk-reduction measures rather than guaranteed containment. Carbon figure is an initial estimate rather than a complete audited carbon account.	**Q28(e)**
Moorland Association / participating land managers (2026), Tintwistle Wildfire, July 2026 – operational response return (unpublished; reproduced at Annex 2)	Unpublished operational / practitioner evidence	Peak District, England; July 2026 Tintwistle wildfire	Personnel, person-hours and specialist equipment mobilised by participating estates and other contributors during wildfire response	Provides quantified operational evidence of locally retained wildfire-response capacity. The return records 48 personnel contributing 2,392 person-hours, alongside specialist off-road vehicles and firefighting equipment. Relevant to the counterfactual concerning practitioner presence, staffing, equipment investment and the capacity available to support emergency wildfire response.	Single-incident, unpublished practitioner return rather than a controlled or peer-reviewed assessment. Not all personnel recorded were gamekeepers. It does not establish that grouse-moor management prevented the wildfire or reduced its size or severity. Equipment values should not be presented as the marginal cost of responding to the incident. The underlying return is supplied at Annex 2 so that Defra can inspect the evidential basis directly.	**Q28(e)**
Scottish Land & Estates (2025), The Response to the Carrbridge and Dava Wildfires by Land-Based and Rural Businesses: A Report for the Scottish Government, 16 July 2025	Sector-produced targeted practitioner survey / operational wildfire report	Carrbridge and Dava wildfires, Scotland; survey of 34 respondents from land-based and rural businesses involved in the 2025 response	Scale and nature of privately provided wildfire-response capability; personnel, training and experience; specialist equipment; containment and suppression techniques; cooperation with emergency services; implications for retention of skills and resources	Provides quantified operational evidence of land-management capacity mobilised during a major wildfire. Records at least 101 employees, of whom 80 (79%) had practical muirburn experience, including 67 who had completed approved training. Respondents deployed substantial specialist equipment, including 34 ATVs and 27 fogging units, and reported techniques including tactical back-burning, fogging, leafblowers and creation of firebreaks. Relevant to the MA's counterfactual concerning practitioner presence, specialist skills, equipment investment and wildfire-response capability if the underlying land-management system materially changes.	Sector-produced and based on a targeted, self-reported survey rather than an independent or controlled study. Scottish legal and land-management context should not automatically be transferred to England. Does not demonstrate that muirburn reduced wildfire size or severity, or that future regulatory change will necessarily cause loss of skills or equipment. The estimated £3.094m equipment value is an indicative capital value of equipment deployed, not the cost of the wildfire response. SLE's policy recommendations and predictions concerning future licensing should be distinguished from the empirical survey findings.	**Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Macgregor, C.J., Ewing, H., Franks, S.E. et al. (2026), Review of Curlew-focused conservation interventions in the UK and Western Europe, and assessment of intervention scenarios using population modelling, BTO Research Report 797	Statutory-funded research report (Defra / Natural England Species Recovery Programme via NE–BTO Research Partnership), combining practitioner questionnaire and population modelling	UK and Western Europe; case studies on proposed northern England Wader Recovery Areas and Wales	Effectiveness of curlew recovery interventions (fencing, predator control, habitat management) and levels of intervention required for population stability	Survey of 28 recovery projects found interventions improved nest success, but chick survival generally remained low. Modelling suggests about 1.06 chicks hatched per breeding pair is needed for stability. The high-productivity scenario is based on grouse-moor-adjacent farmland with intensive predator control (nest success 0.81), and modelled loss of that favourable management cut population growth from 18.3% to 8.0% a year. Notes grouse moors support an estimated 36% of the UK breeding curlew population	Questionnaire sample too small for formal statistics and interventions were usually combined, limiting attribution. Modelling rests on small datasets (e.g. 20 tagged birds; about 500 nest records) and scenarios are explicitly hypothetical. Report also notes contentiousness of predator control and evidence of illegal killing of raptors	**Q8, Q9**
Baker, S.J., Franz Bodenham, R.C., Little, K., Doerr, S. et al. (2026), "Vegetation management saved 7,000 tonnes of soil carbon losses in one of the UK's highest severity peatland fires", Research Square preprint, DOI 10.21203/rs.3.rs-10626235/v1	Preprint of empirical wildfire / carbon study (not yet peer reviewed); NERC IDEAL UK Fire funded	Langdale Moor, North York Moors, England; 1,239 ha fire, August 2025	Burn severity, peat burn depth and soil carbon loss, and the effect of recent vegetation management patches	Estimates 25 kt of soil carbon lost, with burning up to 20 cm into peat. Recently managed patches (mostly burned) were 77% unburned or low severity, with no high-severity burning, and management is estimated to have saved almost 7 kt of carbon. Directly relevant to whether fuel management reduces wildfire severity and peat carbon loss	Preprint; findings may change at peer review. Single fire. Management type and timing inferred from satellite imagery and a limited transect; field access was restricted by unexploded ordnance, and carbon densities were modelled rather than cored. Does not show that management prevents wildfire	**Q28(e)**
Davies, G.M., Domènech, R., Gray, A. & Johnson, P.C.D. (2016), "Vegetation structure and fire weather influence variation in burn severity and fuel consumption during peatland wildfires", Biogeosciences, 13, 389–398, DOI 10.5194/bg-13-389-2016	Peer-reviewed empirical field study	British moorland wildfires, 2011–2012	Drivers of burn severity, fuel consumption and carbon release in peatland wildfires compared with prescribed burns	Burn severity varied up to 1.7-fold within fires; surface fuel consumption was a linear function of pre-fire fuel load; carbon release was 0.36–1.00 kg C m^{-2}. Flammability of moss and litter layers may explain higher carbon release in wildfires than prescribed burns, and drier moorland types were at greater risk of severe burns than blanket bog	Limited number of wildfires sampled. Comparison with prescribed burns relies on published estimates rather than paired measurements. Does not directly test whether management reduces wildfire occurrence or extent	**Q28(e)**
Noyes, P., Winn, V., Jarrett, D. & Wilson, M. (2026), Can upland agri-environment schemes in England support Curlew recovery? A review of current scheme options with farmer perspectives, BTO Research Report 815	Research report (Defra Farming in Protected Landscapes funded, with Yorkshire Dales National Park Authority) combining policy review and qualitative farmer interviews	Yorkshire Dales, principally Wensleydale (upland farmland and grouse-moor mosaic), England	Whether ELM options (SFI and Countryside Stewardship Higher Tier) meet curlew breeding requirements, and farmer views and costs of interventions	Found no SFI or CSHT option provides for lethal predator control and schemes cannot fund facilitators or multi-holding agreements. Notes the intensive, experienced predator control delivered by grouse-moor gamekeepers has rarely been replicated elsewhere. All participating farmers supported lethal predator control in ELM. Relevant to the counterfactual of reduced grouse-moor management and to wader outcomes	Small sample (18 farmers, 11 farms) already engaged with a wader project, so views may not represent the wider farming community. Scheme review is theoretical rather than based on breeding-outcome data. Cost estimates are indicative	**Q11, Q15**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Baines, D. & Aebischer, N.J. (2026), "High and stable Eurasian Curlew Numenius arquata numbers on low-intensity farmland and moorland managed for Red Grouse Lagopus scotica recreational shooting in northern England", Bird Study, DOI 10.1080/00063657.2026.2685164	Peer-reviewed field survey and nest-monitoring study	Upper Teesdale, North Pennines National Landscape, England; 114 1-km squares surveyed 2020–21; nest cameras 2022–23	Curlew abundance by habitat, breeding success, clutch predators and population trend in a grouse-moor-dominated landscape with legal predator control	Estimates 1,764 curlew pairs (about 3% of the UK population). Blanket bog managed by burning or cutting held more than twice the curlew density of unmanaged bog. Curlews fledged about 1.0 chick per pair (1.1 across seven grouse moors), roughly double the 0.5–0.6 needed to sustain numbers, and repeat surveys about ten years apart showed stable numbers (non-significant −3% change) against a national decline of about 49% (1995–2021)	Observational study without an unmanaged comparison landscape in the same design; habitat, altitude, farming and management are intertwined, so effects cannot be attributed to predator control or vegetation management alone. Fledging success came from adult behaviour in a single year with an assumed brood size. Authors are GWCT-affiliated and funding came via GWCT donations, including a local estate. Paper acknowledges illegal killing of raptors on some grouse moors as a possible confounder	**Q8, Q9, Q14**
Andersen, R., Bischoff, M., Johnstone, H. & Large, D. (2026), Active peatland and peatland condition, NatureScot Research Report 1404	Statutory-body commissioned research report (NatureScot)	Scotland; planning and development-on-peat context	Definitions of 'active' and 'functioning' peatland, peatland condition assessment methods, and a condition tool for the Scottish Planning Biodiversity Metric	Examines how definitions and condition concepts for peat and peatland can affect regulatory classification, including ambiguity around 'active' peat formation and the use of threshold-based definitions. Relevant to the MA's argument that protected-site and peatland assessment should identify the ecological feature and causal pressure rather than rely on a single proxy or threshold.	Prepared for Scottish planning and development rather than grouse-moor management. The proposed condition tool was tested on synthetic scenarios and includes normative scoring choices; the authors state that the report does not necessarily represent NatureScot policy. Transfer to English protected-site regulation therefore requires caution.	**Q14**
Heinemeyer, A., Morton, P.A., David, T., Holmes, T., Jones, A.L. & Liu, B. (2025a), "Ecological implications of changes in vegetation elemental composition under different heather (Calluna vulgaris) managements on British blanket bog", Journal of Environmental Management, 392, 126720	Peer-reviewed long-term replicated field experiment with before-after control-impact design	Three blanket bog grouse moors in northern England (Nidderdale, Mossdale, Whitendale), ten years	Effects of burning, cutting and no management on nutrient content of heather and cotton-grass	A ten-year replicated field experiment 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. Relevant to demonstrating experimentally that alternative vegetation-management treatments are not ecologically interchangeable and that effects change through time.	Three northern English blanket-bog grouse moors and a single management event. The study measured plant chemistry rather than bird abundance, livestock performance, carbon balance or biodiversity outcomes. Cotton-grass sampling lacked a pre-management baseline. Funding and declared affiliations should be considered alongside the study design and results.	**Q8, Q12, Q14, Q28(e)**
Minsavage-Davis, C.D., Davies, G.M., Haugum, S.V., Thorvaldsen, P., Velle, L.G. & Vandvik, V. (2024), "Development and evaluation of generalized fuel models for predicting fire behaviour in northern European heathlands", iForest, 17, 109–119, DOI 10.3832/ifor4394-017	Peer-reviewed fuel-modelling study using field fuel data and fire behaviour simulation	England, Scotland and Norway; 296 fuel samples across heathland and blanket mire	How heathland fuel structure varies with vegetation age and habitat, and the resulting predicted rates of fire spread	Produced five generalised fuel models and found that mature and tall building-stage heather produce much the highest predicted rates of spread, while blanket bog communities produce the lowest. Concludes that unmanaged Calluna represents a greater wildfire hazard and that management burning may be an appropriate tool for reducing wildfire risk, while noting that restoration raising water tables may reduce hazard in the longer term. Moss and litter layers, up to 90% of the fuel load on bog, sharply increase spread when dry	Fire behaviour is modelled using the Rothermel system rather than measured, although predictions were validated against 27 experimental burns. Analysis covers the dormant season only, and fuel sampling methods and grazing regimes differed between the UK and Norway. It does not measure whether burning reduces wildfire extent in practice	**Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Szczygieł, R., Tyburski, Ł., Kwiatkowski, M. & Czubak (2025), "Controlled burning as an active method of protecting heathlands – methodology of the procedure", Folia Forestalia Polonica, Series A – Forestry, 67(4), 313–321, DOI 10.2478/ffp-2025-0024	Peer-reviewed methodological article with supporting monitoring results	Dry heathland (Natura 2000 habitat 4030) on former military training ground, Przemków Forest District, Poland	How to plan and conduct controlled burning safely as an active conservation method, and its ecological effects	Provides an independent European example of controlled burning used as a conservation tool, with burning legalised for active conservation in Poland in 2016 because mowing, grazing and turf stripping proved inadequate or too costly. Monitoring found about 85% vegetative regeneration of heather in the first year, a habitat-appropriate mosaic after five growing seasons, and no reduction in plant, fungal or invertebrate diversity. Also sets out planning, weather windows, crewing and training requirements comparable to UK burning codes	Polish lowland dry heath on mineral soils rather than blanket peat, so carbon questions do not arise in the same way. Chiefly methodological guidance rather than a controlled experiment, drawing on three pilot burns, and the five-year monitoring results are reported from an unpublished manuscript	**Q10**
Doerr, S.H., Girona-García, A., Sánchez-García, C., Badía-Villas, D., Bryant, R., Dickson, M.B., Hsieh, R., Mataix-Solera, J., Miesel, J.R., Robichaud, P.R., Stoof, C.R. & Santín, C. (2025), "Soil heating during wildfires and prescribed burns: a global evaluation", International Journal of Wildland Fire, 34(12), WF25103	Peer-reviewed global evidence compilation and evaluation	Global, across vegetation types including shrublands	How much soils actually heat, and for how long, during wildfires and prescribed burns	Provides the international benchmark against which UK measurements can be judged. Reported values for shrublands include mineral soils to 2 cm exceeding 100°C for up to an hour during prescribed burns, with surface temperatures averaging about 304°C, which sets the context for UK findings that cool burns by trained teams barely heat the soil at all	Global compilation spanning very different vegetation and fire types, so figures are not directly comparable with UK cool burns on peat. Details here are taken from a study citing this paper rather than from the original, and should be checked against it	**Q13**
Rainsford, F.W., Campedelli, T., Londi, G. et al. (2026), "Restoring Mediterranean heathlands for declining birds: Initial responses to mosaic cutting and prescribed burning in the Natura 2000 LIFE program", Journal of Applied Ecology, 63, e70283	Peer-reviewed five-year field study with reference areas (EU LIFE Granatha project)	Pratomagno Natura 2000 site, Tuscany, Italy; European dry heaths	Bird and vegetation responses to a mosaic of mechanical cutting and prescribed burning	Found that mosaic cutting and burning regenerated heathland, reduced tree encroachment and supported declining open-habitat birds: the Dartford warbler and cirl bunting declined significantly in untreated reference areas but not in treated areas, and prescribed burning gave slightly faster heathland recovery than cutting. Supports the principle that small-scale, staggered management mirroring historic disturbance sustains bird populations, and that repeat management is needed because vegetation and fuel recover quickly	Mediterranean tree-heath on mineral soils, not UK blanket bog, and only short-term (five-year) responses. Treatment and reference blocks were not interspersed, which the authors acknowledge, and most treatment was mechanical cutting, so burning and cutting could not be compared statistically. Birds recently treated areas avoided in the first year, showing short-term disturbance effects	**Q8**
Arnell, N.W., Freeman, A. & Gazzard, R. (2021), "The effect of climate change on indicators of fire danger in the UK", Environmental Research Letters, 16(4), 044027	Peer-reviewed climate projection study	United Kingdom, all regions; UKCP18 low and high emissions scenarios applied to the Met Office Fire Severity Index	How often conditions conducive to wildfire will occur across the UK under climate change	Projects increasing frequency of conditions conducive to wildfire across every UK region under future climate scenarios. Supports treatment of wildfire resilience as a climate-adaptation issue and the need to assess management options against changing rather than solely historic fire-danger conditions.	Models fire danger rather than ignition or realised wildfire occurrence, and does not test any particular land-management intervention. Human ignition and future management responses are outside the model, so the study identifies changing climatic hazard rather than the effectiveness of a specific mitigation measure.	**Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Muyima, G., Kleynhans, T.E. & de Lange, W.J. (2025), "Determining the direct benefits and costs of prescribed burning: a case study of the Langeberg Mountain veld area, Western Cape, South Africa", Environmental and Sustainability Indicators, 28, 101048	Peer-reviewed financial cost-benefit analysis based on farmer questionnaires	Langeberg Mountains, Western Cape, South Africa; 13 commercial livestock and flower farmers	Whether prescribed burning pays for itself, and why farmers do not do it	Provides evidence that practical and regulatory factors can affect uptake of prescribed burning even where the intervention is estimated to have substantial economic benefits. Reported barriers included liability, permitting delays, labour requirements and transaction costs; relevant to Q11 and Q15 on adoption and deliverability of standards.	South African fynbos shrubland on mineral soils under a different legal system, not English blanket peat. Very small sample of 13 farmers and partly self-reported financial data. Numerical benefit-cost estimates should not be transferred directly to England.	**Q11, Q15**
Lewis, C.H.M., Little, K., Graham, L.J., Kettridge, N. & Ivison, K. (2024), "Diurnal fuel moisture content variations of live and dead Calluna vegetation in a temperate peatland", Scientific Reports, 14, 4815	Peer-reviewed field measurement study	Blanket peat bog with wet heather moor, Cleveland Hills, North York Moors; 554 samples across seven days, March to August 2022	How the moisture content of heather and the underlying moss, litter and peat layers changes through the day and the season	Finds that current wildfire danger models do not perform well in heather, and that moss and litter moisture can rise above and fall below their ignition thresholds within a single day — so models using daily averages understate the risk. A 10% change in live heather moisture is the difference between a fire developing rapidly and failing to ignite, and ignited moss and litter can add 13–67% to available fuel. Live heather moisture was lowest in March. The paper describes the study site's centuries of rotational burning as creating a mosaic 'to improve grouse habitat and prevent the build-up of fuel', a neutral academic statement of what managed burning is for	A single estate over one season, with sampling days deliberately chosen to avoid wet antecedent conditions. It does not compare managed with unmanaged ground or test burning as an intervention, and ignition thresholds for dead heather remain unknown	**Q28(e)**
Bowgen, K., Jarrett, D., Franks, S., Langlois Lopez, S., Clark, N., Clark, J. & Noyes, P. (2025), GPS-tracking breeding Curlews in the Yorkshire Dales: breeding success, home range size, and habitat use, BTO Research Report 793	Peer-reviewed research report using GPS tracking with field ground-truthing	Bolton Estate and neighbouring farms, Wensleydale, Yorkshire Dales National Park; 19 tagged adults, 30 breeding attempts, 2023–2024	Breeding success, home range and habitat use of curlew across a moorland-to-farmland gradient	GPS-tracking study of breeding curlew across a moorland-to-farmland gradient in the Yorkshire Dales. Records breeding productivity and notes high-density curlew farmland adjoining moorland subject to landscape-scale predator control; relevant as supporting evidence on curlew recovery and management context.	Small, non-random sample and habitat differences in breeding success were not statistically significant. Improved-grassland nests in the monitored sample were protected from mowing, and the authors caution against extrapolating beyond the Yorkshire Dales. The study does not isolate predator control as the sole causal factor.	**Q9**
Mason, T.H.E., Littlewood, N., Willis, S.G. & Whittingham, M.J. (2025), "Predicting the combined impacts of future management and climate change on moorland bird species", Journal of Applied Ecology, DOI 10.1111/1365-2664.70196	Peer-reviewed national modelling study	Upland moorland across Great Britain; 8,095 2-km grid cells; BTO Bird Atlas 2007–11 with UKCP18 climate projections	How red grouse, curlew and golden plover would respond to an end to grouse moor management, alone and combined with climate change	Predicts that if grouse moor management ceased, red grouse would decline 33%, curlew 11% and golden plover 6%; combined with climate change by the 2040s those figures become 52–62%, 25–32% and 30–37%. Regionally the North Yorkshire Moors would lose 88–92% of red grouse and 68–72% of golden plover. Abundance of all three species was positively associated with management intensity, at 2.3, 1.4 and 1.1 times unmanaged levels at median intensity. The authors also state the study species would decline strongly if woodland cover increased significantly	The authors describe the effect on curlew and golden plover as 'surprisingly weak': climate and land cover explained far more variation than management, and only about a third of each species was recorded on ground with evidence of burning. They conclude predator control would have only modest mitigatory effects for these two species, note that ending driven shooting would benefit controlled predators and raptors affected by illegal killing, and argue their findings question the long-term future of driven grouse shooting in England as climate suitability falls. Burning extent is a proxy for management because no national predator control data exist, and the analysis is correlative	**Q8, Q9, Q14, Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Collins, L., Trouvé, R., Baker, P.J., Cirulus, B., Nitschke, C.R., Nolan, R.H., Smith, L. & Penman, T.D. (2023), "Fuel reduction burning reduces wildfire severity during extreme fire events in south-eastern Australia", Journal of Environmental Management, 343, 118171	Peer-reviewed observational analysis of fire severity mapping	Victoria, Australia; ten wildfires from the 2018-19 and 2019-20 'Black Summer' seasons	Whether fuel reduction burning moderates wildfire severity under extreme fire weather, and for how long	Found that fuel availability limited fire occurrence and severity within the first 18 months after treatment irrespective of fire weather, with severity moderated for 2–3 years in shrubland and 3–5 years in forest. One of the few studies testing fuel treatment under genuinely extreme conditions, and it shows the effect is real but time-limited. A 2024 meta-analysis of the western United States citing it found prescribed burning reduced subsequent wildfire severity by 62–72%	An important caution as well as a support: the landscape-scale effect was marginal and highly uncertain, fire weather became the dominant driver within 3–5 years, and average burn coverage inside treated perimeters was only 40%, leaving considerable residual fuel. Australian eucalypt forest and shrubland, with severity measured by canopy scorch, which does not transfer directly to treeless blanket bog	**Q28(e)**
Cui, S., Guo, H., Pugliese, L., Nielsen, C.K. & Wu, S. (2025), "Controlled burning of peat before rewetting modifies soil chemistry and microbial dynamics to reduce short-term methane emissions", Communications Earth & Environment, 6, 346	Peer-reviewed laboratory incubation experiment	Degraded organic grazing soils near Viborg, Denmark; 90-day microcosms at 10°C and 20°C	Whether burning the soil surface before rewetting reduces the methane surge that follows rewetting	Laboratory experiment showing that controlled surface burning before rewetting materially altered short-term methane emissions and soil chemistry in degraded organic soils. Relevant as comparative evidence that greenhouse-gas responses to rewetting and fire can be context-dependent rather than having a universal direction of effect.	A 90-day laboratory incubation on degraded Danish agricultural organic soils, not a field trial or UK blanket bog study. The authors explicitly call for field testing before application and identify possible leaching and smouldering risks. It should not be used to advocate equivalent treatment in English peatlands.	**Q28(e)**
Ivison, K., Little, K., Orpin, A., Belcher, C.M., Clay, G.D., Doerr, S.H., Smith, T.E.L., Andersen, R., Graham, L.J. & Kettridge, N. (2025), "Unprecedented UK heatwave harmonised drivers of fuel moisture creating extreme temperate wildfire risk", Communications Earth & Environment, 6, 727	Peer-reviewed national field measurement and fire behaviour modelling study	43 peatland, heathland and acid grassland sites across Great Britain; 5,845 samples over 2021–2023, with intensive sampling during the July 2022 heatwave	How the moisture of live heather, dead heather and organic ground layers responds to extreme heat, and what that means for fire behaviour	Normally the drivers of moisture in these three fuel layers are out of phase, which the authors say gives these ecosystems considerable resistance to wildfire. The July 2022 heatwave harmonised them: dead heather moisture fell to an average of 4.2% against 17.7% the previous July, and the organic layer reached its lowest in three years. Modelled rate of spread more than doubled against spring and was more than four times a typical July, and flame length rose above 1.5 metres, the threshold above which direct attack with hand tools is not permitted. Probability of ignition rose to 87%. The authors conclude that effective fuel management strategies will be required, and that fuel management will become essential because otherwise flame lengths and rates of spread will exceed traditional direct attack, calling for resources for firefighters and the land management community	The study does not test burning or any specific fuel management method, and does not compare managed with unmanaged ground: the call for fuel management is a conclusion drawn from the fire behaviour, not a test of it. Fire behaviour figures are BehavePlus simulations rather than observed fires, and the intensive sampling covers three days in a subset of regions, with the Scottish Highlands excluded as too wet	**Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Heinemeyer, A., Berry, R. & Sloan, T.J. (2019), "Assessing soil compaction and micro-topography impacts of alternative heather cutting as compared to burning as part of grouse moor management on blanket bog", PeerJ, 7, e7298	Peer-reviewed plot-scale field experiment	English blanket bog grouse moor sites within the Defra BD5104 programme	Whether heavy machinery used for cutting compacts peat or damages surface micro-topography compared with burning	Despite the weight of the tractors used, the peat proved resilient and there was no lasting plot-level effect on peat depth or bulk density; the bulk density differences observed were present before management and reflected natural change with peat moisture. Useful to the MA not as a case for burning but as a reminder that the leading alternative carries its own caveats: the authors note compaction may be site specific, that impacts at machinery resting and turning points were not assessed, and that cutting height and machinery type need adjusting where micro-topography matters because cutting can shave the tops off hummocks	This paper broadly clears cutting of the compaction objection rather than supporting burning, and the authors describe rotational burning in their own framing as linked to habitat degradation. Small plot-scale study over a short monitoring period, measuring neither carbon flux, biodiversity nor wildfire risk. The published peer review history contains a substantive challenge to the 'no lasting effect' conclusion on the grounds that natural moisture-driven variation was not quantified, so conclusions should be quoted carefully	**Q12, Q14, Q28(e)**
Zhang, Q., Wang, Y., Xiao, Q., Geng, G., Davis, S.J. et al. (2025), "Long-range PM2.5 pollution and health impacts from the 2023 Canadian wildfires", Nature, 645, 672–678	Peer-reviewed satellite, machine learning and chemical transport modelling study	Global, focused on North America and Europe; the 2023 Canadian wildfire season	How far wildfire smoke travels and what health burden it imposes across continents	The 2023 Canadian fires burned 15 million hectares, more than seven times the long-term annual mean, and produced the highest fire emissions in at least twenty years. Smoke crossed the Atlantic: annual mean fine particulate exposure rose by 0.41 μg/m³ across Europe, where 620 million people — 90% of the population — were affected. In the United States the Canadian fires contributed four times more particulate pollution than America's own fires that year. The authors estimate 64,300 chronic deaths across North America and Europe, of which 22,400 were in Europe. The clearest available demonstration that the health cost of a large wildfire is not confined to the burnt area	Canadian boreal forest at a scale no UK fire approaches, and a modelling study rather than direct measurement. The authors are explicit that mortality estimates vary by a factor of four for acute and five for chronic deaths depending on the exposure-response function chosen, that fire emission inventories differ substantially, and that chronic mortality had to be estimated using an all-source rather than wildfire-specific function because the epidemiology does not yet exist. Quote the exposure figures with more confidence than the death figures	**Q28(e)**
Riss, C.S., Faulstich, S.D., Reuther, P.S., Metcalf, W.J., Darrow, L.A., Holmes, H.A. & Strickland, M.J. (2025), "Influence of fire characteristics on the associations between smoke PM2.5 exposure and acute cardiorespiratory health events", Environment International, 201, 109577	Peer-reviewed epidemiological time-series study	Reno/Sparks, Nevada; 173,954 emergency and urgent care visits across the 2012–2019 fire seasons, with smoke attributed to 217 individual source fires	Whether the health effects of smoke differ according to the intensity and fuel type of the fire that produced it	Large epidemiological analysis testing whether characteristics of source fires modified associations between smoke PM2.5 and acute cardiorespiratory healthcare use. Relevant to the MA's whole-system assessment because it shows that wildfire smoke is a material health externality and that health effects can differ with fire characteristics.	Nevada forest, shrub and grassland context, not English heather moorland. Low-intensity fire was used as a proxy for prescribed-fire conditions and only a small number of documented prescribed fires contributed to exposure. Associations do not establish that any particular UK management regime would increase or reduce population health impacts.	**Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Jones, G.M., Spannuth, A., Chongpinitchai, A. & Hurteau, M.D. (2025), "Prescribed fire, managed burning, and previous wildfires reduce the severity of a southwestern US gigafire", Forest Ecology and Management, 580, 122540	Peer-reviewed landscape-scale observational analysis	The 2022 Black Fire, Gila National Forest, New Mexico; over 131,000 hectares burned, 54% of it previously treated	Whether earlier fuel treatment changed how a very large wildfire burned	Previously treated area was the single most important predictor of high-severity fire at every scale examined, outweighing both fire weather and vegetation. A fully treated area experienced 51% less high severity fire than an untreated one, and where high-severity fire ran into a treated area severity fell by 21–55% within 250 metres of the boundary. Only about 4% of this very large fire burned at high severity, which the authors conclude made it restorative rather than catastrophic. Crucially they identify the reason fuel treatment often appears ineffective: as a fire grows, the proportion of the landscape treated must grow with it, and in most places treatments are far too small relative to the area burned	Ponderosa pine and mixed conifer forest in New Mexico, a fire-adapted system quite unlike blanket bog, with severity measured through canopy effects that do not transfer to treeless moorland. Observational rather than experimental, a single fire event, and much of the 'treatment' was previous wildfire rather than deliberate burning.	**Q28(e)**
Ahmad, A.A., Fletcher, K., Hesford, N. & Glendinning, L. (2025), "Metagenomics reveals fibre fermentation and AMR pathways in red grouse (Lagopus scotica) microbiota", BMC Microbiology, 25, 520	Peer-reviewed metagenomic sequencing study	Caecal samples from 15 red grouse shot on three managed Scottish moorland estates, 2023 season	The gut microbiology that allows red grouse to live on heather	The first characterisation of the red grouse gut microbiome using modern sequencing. Eleven of the twelve bacterial genomes reconstructed could not be matched to any known species, suggesting they are new to science. The bacteria carry the enzymes for digesting cellulose, hemicellulose and pectin and for breaking down the phenolic compounds in heather — the machinery that lets grouse live on a diet that is a quarter fibre and only 7% protein. The authors note that shot game birds provide these samples as a by-product, making research possible that would otherwise require killing birds	Says nothing about burning, management, wildfire or predator control, and is not evidence for or against any management practice. Fifteen birds from three estates with no comparison to unmanaged ground, 89% of the sequence data was host contamination, and the authors describe the small number of recovered genomes as the study's main weakness. Its honest use is a single sentence on novel microbial diversity and research access, not a management claim	**Q28(c)**
Brüggeshemke, J., Henning, O. & Fartmann, T. (2025), "Territory densities of heathland breeding birds are enhanced by fire on military training areas", Global Ecology and Conservation, 58, e03447	Peer-reviewed comparative field study	Lüneburg Heath, northern Germany; 91 randomly selected 30-hectare plots across a fire-managed military training area and a grazed nature reserve; 2,496 bird territories of 11 characteristic species	Whether heathland managed by fire supports more breeding birds than heathland managed by grazing and cutting	Comparative German heathland study found higher densities of characteristic open-heathland birds on the fire-managed area and discusses how different management methods affect vegetation structure and nutrient cycling. Relevant as supporting evidence for the ecological importance of habitat heterogeneity and disturbance history.	German lowland dry heath on mineral soil rather than English blanket bog. Two sites differed in management history and other disturbance, including military activity, so fire effects cannot be isolated cleanly. Results should not be transferred to peat-carbon outcomes.	**Q8**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Rittl, T.F., Farsund, P.G., Pommeresche, R., Sørheim, K.M., Wibe, A., Hellekås, J. & Velle, L.G. (2025), "Traditional Norwegian farming practices drive biodiversity – a case study from coastal heathlands", Agriculture, Ecosystems & Environment, 388, 109662	Peer-reviewed multi-taxon field study	Coastal Calluna heathland, Nerlandsøy, western Norway; pioneer, building and mature phases under winter burning and year-round sheep grazing	Whether burning and grazing reduce biodiversity or create the heterogeneity that sustains it	Multi-taxon Norwegian coastal-heathland study found distinct communities associated with different managed successional phases and higher overall biodiversity across the management-created mosaic than within any single phase. Relevant to the principle that habitat heterogeneity can support different species assemblages.	Single coastal-heathland system on shallow peaty/mineral soils, not deep English blanket bog. Burning and grazing effects could not be separated and immediate post-fire effects were not sampled. It should not be used to infer peat-carbon outcomes.	**Q8**
Barros, B., Paiva, A.M., Azevedo, R., Alves, S., Esteves, F., Fernandes, A., Vaz, J., Alves, M.J., Slezakova, K., Teixeira, J.P., Costa, S., Almeida, A., Oliveira, M. & Morais, S. (2025), "Impact of wildfire emissions exposure on the associations between levels of lung injury, lipid peroxidation, DNA oxidation, and exposure biomarkers", Science of the Total Environment, 993, 180012	Peer-reviewed occupational biomonitoring study	23 wildland firefighters in Bragança, northern Portugal, with paired pre- and post-exposure urine samples, 2021–2022	The physiological harm wildfire smoke does to the people fighting it	Paired biomonitoring of wildland firefighters before and after wildfire response found increases in biomarkers associated with lung injury, oxidative stress and combustion-product exposure. Relevant to the health and occupational externalities of severe wildfire response.	Small sample of 23 firefighters in Portugal, without an external control group, and a different vegetation and operational context. The study does not quantify health effects from UK moorland fires and does not imply that prescribed burning is exposure-free.	**Q28(e)**
Ji, S., Li, G., Cong, J., Xu, H., Han, D. & Gao, C. (2025), "Prescribed burning effects on carbon and nutrient cycling processes in peatlands of Greater Khingan Mountains, Northeast China", Science of the Total Environment, 963, 178441	Peer-reviewed three-year field experiment	Peatland in the Greater Khingan Mountains, northeast China, burned annually each autumn to stop fire spreading into adjacent forest	Whether prescribed burning on peatland depletes or builds soil carbon	Three-year field experiment in north-east China reported greater soil organic carbon in low-intensity prescribed-burn plots than unburned plots and explored mechanisms involving vegetation recovery and ash effects. Used only to illustrate that peatland carbon responses to burning can be context-dependent.	Permafrost-influenced peatland with very different climate and soil conditions from British blanket bog; single site and short duration. The findings should not be used to advocate equivalent treatment in England.	**Q28(e)**
Baker, S.J., Perry, M.C., Betts, R.A., Schoenecker, J. & Pellegrini, A.F.A. (2025), "Spikes in UK wildfire emissions driven by peatland fires in dry years", Environmental Research Letters, 20, 034028, DOI 10.1088/1748-9326/adafc6	Peer-reviewed national wildfire-emissions modelling study	United Kingdom, 2001–2021	Carbon emissions from UK wildfires and the contribution of peat combustion in dry years	Estimates about 776 kt of carbon emitted from fires burning peat in the UK between 2001 and 2021 (including about 24 kt from Saddleworth Moor), with emissions spiking in dry years. Relevant to the scale of wildfire carbon risk on peatland and the need for effective wildfire mitigation	Model-based estimates using a national bulk density and a soil-moisture scaler; later field work at Dava Moor found the model overestimated peat burn depth and bulk density there. Does not assess which management interventions reduce emissions	**Q28(e)**
Whitehead, S.C. & Baines, D. (2018), "Moorland vegetation responses following prescribed burning on blanket peat", International Journal of Wildland Fire (ResearchGate record 327794635)	Peer-reviewed field study	Blanket peat moorland, northern England	Vegetation change, including heather and peat-forming species, following prescribed burning	Provides site-specific primary evidence on blanket-bog vegetation responses following prescribed burning, including responses of Sphagnum, cotton-grass and heather. Relevant to testing claims about post-burn vegetation recovery and protected-habitat condition.	Observational study of particular sites and burn histories rather than a randomised experiment. Results may not generalise across peat depth, hydrology, burning regime or site condition and do not demonstrate that burning is appropriate on every blanket-bog site.	**Q12, Q14, Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Denny, S. (March 2025), "Wildlife Warden, Conservation Manager, Fire Fighter, and Educator: The Grouse Moor Gamekeeper in England in the Twenty-First Century", commissioned by the Regional Moorland Groups and the National Gamekeepers' Organisation	Commissioned survey-based research report	58 English grouse moors totalling 444,370 acres with 194 keepers — 43% of the 140 moors in the Regional Moorland Groups	What upland gamekeepers actually do, and the economic, environmental and social effects of that work	Survey of 58 English grouse moors records gamekeepers undertaking habitat and wildlife management, wildfire preparedness and response, liaison and training with Fire and Rescue Services, and assistance on land not managed for grouse shooting. Relevant to practical skills, employment, community functions and wildfire-response capacity within the existing management system.	Commissioned, self-reported practitioner evidence rather than peer-reviewed research. The sample covered 58 moors and should not be treated as nationally representative. Returns were checked against incident logs, work records and estate accounts and unreliable returns were excluded, but reported figures remain sector-supplied and do not establish causal ecological effects.	**Q28(e), Q29**
Warren, P., Land, C., Hesford, N. & Baines, D. (2020), "Conserving Black Grouse Lyrurus tetrix in southern Scotland: evidence for the need to retain large contiguous moorland habitat within a forest-moorland landscape", Bird Study, 66, 494–502	Peer-reviewed long-term survey analysis	121 black grouse leks across southwest and southeast Scotland, surveyed between 1989 and 2018	What determines whether black grouse persist in a landscape of mixed forest and moorland	Long-term analysis of 121 black-grouse leks found persistence associated with larger contiguous moorland, more rough grassland and less conifer woodland; leks on driven-grouse moorland held more males. Relevant to habitat fragmentation, replacement land use and the ecological counterfactual for a Red-listed species.	Observational rather than experimental. Black grouse declined across the study region, including on managed grouse moors, so the study does not show that grouse management prevented the wider decline. Associations with management are correlative and other habitat and predator-management factors may contribute.	**Q9, Q14**
Whitehead, S., Weald, H. & Baines, D. (2021), "Post-burning responses by vegetation on blanket bog peatland sites on a Scottish grouse moor", Ecological Indicators, 123, 107336	Peer-reviewed field chronosequence study	Langholm Moor, southwest Scotland; average peat depth 155 cm; 48 burns aged four to ten years plus 16 unburned controls across nine blocks	How blanket bog vegetation, and Sphagnum in particular, responds in the years after a prescribed burn	Provides site-specific evidence on post-burning vegetation trajectories on blanket bog. The study recorded 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. It is also cited in Q29 for its observation that gamekeepers hold specialist fire-management experience and equipment.	Observational chronosequence at one Scottish grouse moor using historic burn locations rather than a randomised experiment. Water table, weather, grazing history and other site factors may confound responses. The authors were GWCT-affiliated and the study should not be treated as demonstrating that burning is appropriate on all blanket bogs.	**Q12, Q14, Q28(e), Q29**
Baines, D. (2025), "Ten years on from a predator removal experiment in the English uplands: changes in numbers of ground-nesting birds and predators", Journal for Nature Conservation, 84, 126788	Peer-reviewed resurvey of an earlier controlled experiment	Four plots of 9 to 14 km² around Otterburn, North Northumberland; experiment 2000–2008, resurvey 2018–2019	What happened to ground-nesting birds when predator control stopped	Provides long-term follow-up evidence from the Otterburn study area. About ten years after the earlier predator-control programme ceased, carrion-crow abundance and the fox index had increased while golden plover, snipe, red grouse and curlew had declined substantially; black grouse and grey partridge were no longer recorded on the study plots. Relevant to the potential population consequences of changes in generalist-predator abundance.	Observational resurvey of four plots in one study area rather than a continuation of the original controlled experiment. The paper notes wider national declines in some species, identifies released pheasants and partridges as a possible contributor to high generalist-predator densities, and records continuing illegal killing of protected raptors. It does not isolate predation as the sole cause of the later changes.	**Q8, Q9, Q12, Q14**
Ludwig, S.C., Aebischer, N.J., Richardson, M., Roos, S., Thompson, D.B.A., Wilson, J.D. & Baines, D. (2020), "Differential responses of heather and red grouse to long-term spatio-temporal variation in sheep grazing", Biodiversity and Conservation, 29(8), 2689–2710	Peer-reviewed long-term study	Langholm Moor, southwest Scotland	How heather cover and red grouse respond to changes in sheep grazing pressure over decades	Long-term Langholm analysis examining relationships between sheep grazing, heather cover and red grouse. Relevant to identifying grazing as a separate vegetation driver and to the MA's argument that changes in heather condition can reflect multiple interacting pressures rather than one management practice alone.	Single Scottish site with a distinctive management history and observational long-term design. Changes in grazing, vegetation, grouse abundance and other environmental factors occurred through time, limiting attribution of all responses to one variable.	**Q8, Q12, Q14**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Fielding, D., Newey, S., Pakeman, R.J., Miller, D., Gagkas, Z., Matthews, K. & Smith, S.W. (2024), "Limited spatial co-occurrence of wildfire and prescribed burning on moorlands in Scotland", Biological Conservation, 296, 110700	Peer-reviewed national spatial analysis	Scottish moorlands totalling 39,000 km²; muirburn mapped from aerial imagery for 2018, wildfire from satellite and fire service records 2015–2020	Whether wildfires happen on the same ground as prescribed burning	Scottish Government-funded spatial analysis found limited overlap between mapped prescribed burning and wildfire: 96% of mapped wildfire area occurred outside moorland identified as managed by muirburn. Relevant to the relationship between management systems, fuel treatment and wildfire occurrence.	The study expressly provides no mechanistic evidence that prescribed burning caused lower wildfire occurrence. Wildfire was not progressively lower with increasing muirburn intensity, and alternative explanations include grazing, prevention strategies, firebreaks, trained personnel, equipment and differences in recreational ignition pressure. Prescribed burns can also escape.	**Q13, Q28(e)**
Macgregor, C.J., Pearce-Higgins, J.W., Siriwardena, G.M., Wilson, M.W. & Robinson, R.A. (2025), "Assessment of recent Hen Harrier population trends in England through population modelling", BTO Research Report 778, Natural England Commissioned Report	Commissioned population modelling study	England, covering the brood management trial period 2018–2024 and 221 recorded breeding attempts	What caused the rapid rise in English hen harrier breeding attempts during the brood management trial	Natural England-commissioned population modelling of 221 hen-harrier breeding attempts during 2018–2024. The modelling found that the direct productivity effect of brood management and diversionary feeding was too small to explain most of the increase in breeding attempts; the observed increase required improvements in survival, settlement or both. Reduced illegal killing or nest interference coincident with brood-management availability was identified as one plausible mechanism.	Population modelling cannot establish that survival actually increased or determine the extent to which illegal killing reduced. Illegal killing continued during the trial period. The report does not attribute recovery solely to brood management and should be used to distinguish direct productivity effects from wider conflict-mitigation mechanisms.	**Q9, Q20–21**
Etheridge, B., Summers, R.W. & Green, R.E. (1997), "The effects of illegal killing and destruction of nests by humans on the population dynamics of the Hen Harrier Circus cyaneus in Scotland", Journal of Applied Ecology, 34, 1081–1105, DOI 10.2307/2405296	Peer-reviewed population study	Scotland / hen harrier population	Effects of illegal killing and nest destruction on hen-harrier population dynamics	Provides historical peer-reviewed evidence that illegal killing and nest destruction materially affected hen-harrier population dynamics. Used with later satellite-tracking and modelling evidence to establish the conservation risk which standards and conflict-management measures are intended to address.	Historic Scottish evidence from a different period and regulatory context. It establishes population-level effects but does not describe current incidence or prove the circumstances of any present-day individual event.	**Q20–21**
Ewing, S.R., Thomas, C.E., Butcher, N. et al. (2023), "Illegal killing associated with gamebird management accounts for up to three-quarters of annual mortality in Hen Harriers Circus cyaneus", Biological Conservation, 283, 110072, DOI 10.1016/j.biocon.2023.110072	Peer-reviewed satellite-tracking / survival study	Britain; 148 satellite-tagged hen harriers, 2014–2021	Survival, causes of mortality and spatial/temporal association of mortality with grouse-moor use	Provides recent population-level evidence that illegal killing was a major demographic pressure on hen harriers and was strongly associated with use of land managed for grouse shooting. Forms part of the scientific baseline used in Q20–21.	Population-level statistical inference does not establish the fate, offender or circumstances in every individual case. The paper's policy recommendations are distinct from its empirical survival analysis and should be treated separately.	**Q20–21**
Baird, A.J., Evans, C.D., Mills, R. et al. (2019), "Validity of managing peatlands with fire", Nature Geoscience, 12, 884–885, DOI 10.1038/s41561-019-0477-5	Peer-reviewed scientific comment / critique	UK blanket peatland / critique of the Moor House long-term burning experiment	Transferability and interpretation of experimental evidence on managed burning and peat-carbon outcomes	Provides published scientific challenge to the wider applicability of the Marrs et al. experiment, arguing that results from a degraded, gullied and Calluna-dominated site should not automatically be extrapolated to natural or rewetted peatlands. Used to demonstrate continuing scientific disagreement over interpretation and transferability.	Scientific comment rather than a new field experiment. It challenges interpretation and generalisation but does not invalidate the underlying measurements; it should be read alongside Marrs et al.'s response and the later evidence base.	**Q28(e)**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
Fenton, J.H.C. (2022), "The contribution of Antarctic moss peat to the understanding of global peatland processes", Antarctic Science, 34(3), 266–278, DOI 10.1017/S0954102022000141	Peer-reviewed conceptual / comparative peatland study	Maritime Antarctic moss peat, with relevance discussed to wider peatland processes	Natural peat growth, creep, erosion and peatland dynamics	Used narrowly to illustrate that visible peat erosion can occur through natural peatland processes and therefore should not, without additional causal evidence, automatically be attributed to a particular land-management practice.	Antarctic moss peat is a highly simplified and very different system from English blanket bog. The study does not establish that erosion on English moors is generally natural, benign or unrelated to management.	**Q28(e)**
IUCN Species Survival Commission (2023), IUCN SSC Guidelines on Human-Wildlife Conflict and Coexistence, 1st edition	International conservation guidance / good-practice framework	Global / human-wildlife conflict and coexistence	Evidence assessment, causal reasoning, stakeholder participation, policy instruments, monitoring and adaptive management in contested wildlife-management situations	Provides methodological principles used in the response: avoid premature causal assumptions, consider ecological and social context, assess unintended consequences, involve affected stakeholders and use monitoring and adaptive management.	Not specific to grouse shooting, English uplands or any particular ecological effect. Used for decision-making and regulatory-design principles rather than as evidence of the environmental impacts of gamebird activities.	**Q8, Q10–11**
RSPB (2023), Time for change: Driven Grouse Shooting Advocacy Report – Commit to licensing	Organisational advocacy / policy report drawing on existing evidence	England / driven grouse shooting	RSPB case for licensing, environmental impacts and future policy options for driven grouse shooting	Used principally to distinguish organisational advocacy from underlying scientific evidence and, with the Rayment work, to illustrate the RSPB's own recognition that changes to driven shooting can have economic, management and species consequences.	Advocacy document rather than an independent scientific review or primary study. Its policy conclusion should not be counted as additional scientific evidence beyond the underlying sources on which it relies.	**Q8**
Office for National Statistics (2022), Habitat extent and condition, natural capital, UK: 2022 – mountain, moorland and heath indicators	Official national statistics / experimental natural-capital indicators	Great Britain / UK mountain, moorland and heath	Bird, moth and other habitat-condition indicators used in natural-capital accounting	Provides national context for wider moorland biodiversity trends, including the reported 12% increase in the unsmoothed moorland bird index from 1994 to 2019 and a fourfold increase in the moth-abundance index from 1991 to 2019.	The moorland bird index is an experimental natural-capital indicator, not the official bird index; results apply to broad mountain, moorland and heath habitats rather than specifically to grouse moors and conceal substantial species-level variation.	**Q9**
RSPB Annual Reserve Avian Monitoring dataset, published through the NBN Atlas; Moorland Association matched reserve/species analysis reproduced at Annex 6	Public monitoring dataset with MA secondary analysis	RSPB reserves / UK; MA comparison of 2014–2018 with 2019–2023, excluding 2020	Recorded changes in selected upland bird counts on RSPB reserves	Used as a methodological comparator showing mixed trajectories among upland bird species on land managed principally for conservation purposes, reinforcing the need for species- and mechanism-specific analysis.	The dataset was not designed as a controlled comparison of management systems. Survey effort and reporting vary among reserves and years; the records do not establish causation or equivalent survey coverage. MA analysis should not be represented as showing that RSPB management caused recorded changes.	**Q9**
NatureScot (2024/26), Code of Practice for Grouse Moor Management	Statutory code of practice supporting the Scottish grouse-licensing regime	Scotland / licensed red-grouse land	Legal requirements, licence compliance and good-practice standards for grouse-moor management	Used to distinguish the existence of a statutory licensing/code framework from an evidential threshold defining acceptable or unacceptable shooting intensity. The Code requires compliance and monitoring but does not itself establish a scientifically defined intensity threshold.	Scottish legal and regulatory context. A code specifies requirements but does not by itself demonstrate that the required practices have produced particular biodiversity outcomes or that licensing is the appropriate response to an undefined concern about intensity.	**Q10**
Peak District Moorland Group, The Blanket Approach is Failing: An independent review into Sphagnum inoculation on Peak District moors	Independent review / operational case-study report	Peak District, England; deep-peat SSSI restoration sites	Sphagnum inoculation following approved vegetation cutting and observed establishment success	Provides site-specific operational evidence used to illustrate why a prescribed management process should be tested against the ecological outcome achieved and adapted where monitoring shows poor establishment.	Not a controlled scientific experiment and not evidence that Sphagnum inoculation is generally ineffective. Results concern particular sites, planting methods and hydrological conditions and should not be generalised without further evidence.	**Q10**

Source	Evidence type	Geography / context	Principal issue or outcome examined	Relevance to MA response	Important limitations / qualifications	Question(s)
HM Government (2023), The Third National Adaptation Programme (NAP3) and the Fourth Strategy for Climate Adaptation Reporting	Government climate-adaptation programme	United Kingdom / England	Climate adaptation priorities, including wildfire-risk research and effective wildfire-risk reduction measures	Provides policy context for treating wildfire resilience as an adaptation outcome requiring dedicated evidence, including commitments to wildfire-risk mapping and research on effective risk-reduction measures.	Policy programme rather than primary scientific evidence. It identifies adaptation needs and research commitments but does not establish the effectiveness of any individual vegetation-management intervention.	**Q28(e)**
Regional Moorland Groups (2024), The People's Plan for the Uplands	Sector-commissioned community survey / policy report	English upland communities; online survey of people connected with upland areas	Community perceptions of upland management, rural identity, field sports, conservation and traditional land-management practices	Provides contemporary evidence of how respondents connected with the English uplands perceive community, cultural and management outcomes, and is used alongside other social evidence in Q29.	Self-selecting online survey commissioned by Regional Moorland Groups rather than a representative population survey. Reported percentages describe respondents, not all upland residents or the wider public, and perceptions do not establish causal ecological or economic effects.	**Q29**
Scottish Government (2023), Wildlife Management and Muirburn (Scotland) Bill: Business and Regulatory Impact Assessment, section 17	Government business and regulatory impact assessment	Scotland / proposed grouse-moor and muirburn regulation	Regulatory review cycles, business impacts and implementation of new wildlife-management regulation	Used to show that statutory grouse-moor and muirburn codes were expected to be reviewed at least every five years, supporting the need for clear baselines, evidential thresholds and genuinely symmetrical review.	Scottish policy appraisal prepared for a different legal regime. It does not demonstrate the environmental or economic effect of English regulation and should be used only as comparative regulatory evidence.	**Q28(e)**
Scottish Gamekeepers Association (2023), Take our JOBS survey (7 June 2023) and Warning to Scottish Government that gamekeeping profession is 'close to breaking point' (12 August 2023)	Sector member survey / practitioner commentary	Scotland / gamekeeping and rural employment during regulatory and land-use change	Reported changes in gamekeeping and related employment and perceptions of regulatory uncertainty	Used as practitioner evidence that employment contraction, non-replacement of posts and reduced confidence were being reported before the Scottish grouse-licensing regime became operational, relevant to anticipatory and cumulative effects.	Published material does not state the number of respondents, quantify total jobs lost or provide a regional breakdown, and cannot establish the cause of each employment decision. It predates operation of the licensing regime and therefore cannot measure its subsequent effects.	**Q28(e)**
Moorland Association (2026), upland SSSI unit-condition and last-inspection compilation reproduced at Annex 5	MA compilation and analysis of official SSSI unit data	English upland SSSIs	Recorded SSSI condition categories and currency of inspection records	Used to illustrate the need to distinguish condition classification from causation and to check evidential currency; the MA records that 582 of 801 unit records examined had a recorded last-inspection date of 2016 or earlier.	MA secondary analysis of official records. Older inspection dates do not prove that no subsequent monitoring or management evidence exists, and condition categories do not establish the cause of favourable or unfavourable status.	**Q14**