



UPLAND EVIDENCE REVIEW 2012

Response to Stakeholder Comments on draft questions, May 2012.

The topic areas to be covered by the review are:

- Impacts of tracks and vehicle use on soil structure and hydrology and their impacts on biodiversity.
- Impacts of managed burning on peatland biodiversity and ecosystem services.
- Appropriate management regimes for sustaining biodiversity in upland hay meadows.
- Determination of environmentally sustainable stocking regimes on moorland.
- Feasibility of restoring degraded blanket bog including areas such as drainage, vegetation cover (peat forming species), and climate change.

Comments received on draft questions are listed below, together with Natural England's response

Topic: General

Name	Reference	Comment	Natural England Response
Response from the Exmoor Moorland Initiative Board	General	The Moorland Initiative Board welcomes the Upland Policy Review and recognition of the need to provide guidance and policy which is based on sound evidence. It also welcomes the recognition of the need to strengthen Natural England's working relationships with those who own and actively manage the uplands. We would be pleased to work with you on the Review particularly on questions around blanket bog restoration, tracks, burning peatland and grazing.	Thank you for your positive response to the review and your input to the draft questions. We would welcome your contribution to evidential material.
Response from the Exmoor Moorland Initiative Board	Engaging with farmers/landowners	In addition to the questions and methodology proposed we would encourage you to engage with people who own and farm the land in order to understand how they have managed the moor, the issues that affect current management and where they see future challenges. This social research should accompany and complement the more ecologically focussed review set out in your questions.	We acknowledge the importance of land managers and socio-economic circumstance in shaping on-the-ground practice. The focus of this review is ecological. Evidence-based ecological conclusions will inform management recommendations that are nuanced by these other important factors which you have highlighted.
Response from the Exmoor Moorland Initiative Board	Methodology	We encourage you to be aware of the variations in management, issues, growth rates, climate and farming practice between the north and south. There is a frustration in the south west that "northern" management guidelines, particularly around swaling and grazing, are sometimes applied	Spatial components will be considered as part of the review of evidence where there are explicit ecological differences.

		to the southern moors.	
Response from the Exmoor Moorland Initiative Board	Evidence	<p>The Moorland Initiative Board has a growing evidence base which we have been working on since 2009. This includes a series of Case Studies looking at responses to heather beetle under different management practices, ecological assessments of the impacts of large and small burns, and visual impacts of different swaling methods. Further (MA student) research has looked at the impact of historic burns on vegetation variety and at growth rates of heather across the moor. We are in the process of a review of Exmoor Moorland Management (being carried out by an ecological consultant) and have recently started a further Case Study with the Heather Trust and NE looking at the impacts of winter cattle grazing on an area of moorland. The Exmoor Mires project has a wealth of data on peatland restoration techniques and impacts, hydrology, flora and fauna and archaeology of the Exmoor Forest. Social research on Exmoor in 2010 looked at changing attitudes to swaling and moorland grazing which you may find of interest. We also carry out an annual Review of swaling which looks at areas burned, costs and issues encountered. Finally, we are working on an oral history project which is exploring how moorlands were historically managed.</p> <p>We would be delighted to share this experience and research with you.</p>	We would welcome this contribution to the evidence for consideration in respect of the review questions.
Response from the Exmoor Moorland Initiative Board	General - focus	We note that the research has a strong focus on biodiversity, water and carbon. We would encourage NE to consider landscape and visual impacts of tracks, swaling and grazing, particularly given the importance of cultural ecosystems services in Protected landscapes	Noted. The focus of this review is ecological, but the point raised is significant in the context of ecosystem services. We have noted and will consider as part of any other review with an Upland focus.
South West Uplands Federation (SWUF)	General	SWUF welcomes Natural England's review of evidence related to the English uplands. However the English Uplands, whilst sharing some generic characteristics, are also extremely varied. This diversity must be recognised and celebrated. Diversity even exists within discreet moorland blocks and is partly responsible for the unique landscapes. So whilst sound evidence is required Natural England must not assume that what relates to one area is automatically applicable to other areas. The imposition of methodologies derived from evidence gathered in the north on to the southern uplands continues to cause problems for Natural England and farmers.	Spatial components will be considered as part of the review of evidence where there are explicit ecological differences.
South West Uplands Federation (SWUF)	Scope of review	The 5 topics selected do not appear to SWUF to be comprehensive or reflect the main ecosystem services that the uplands provide. Whilst some are of relevance in the southern uplands most appear to relate to the northern moors and specific issues relating to grouse moor management	The Uplands provide a wide range of ecosystem services. A single evidence review to address the whole breadth of these is not achievable at this time. The topics selected reflect particular ecological issues / challenges that have been raised with us by

		(irrelevant in the SW). Natural England has an opportunity to demonstrate that its review of evidence relating to the English Uplands is unbiased and related to all upland areas. SWUF recommends the topics are changed to address all relevant ecosystem services rather than specific issues.	upland stakeholders. They are not intended to be comprehensive. We are keeping a record of other issues raised which may be considered in future reviews.
Moorland Association	General	In each section the effect or impact of making any changes should be assessed and valued.	Valuation of change is outside of the ecological scope of the review. We acknowledge its importance but feel this is a consideration for management recommendations not evidential conclusions.
Northumberland National Park Authority	IUCN Peatland Inquiry	It is thought that some of the questions, particularly in the burning section have already been addressed by the IUCN Peatland inquiry and this should not be reinventing the process, but using their findings.	Noted. It is expected that the findings of the inquiry will be considered as part of the evidence review.
NFU	General	<p>NFU welcomes the opportunity to engage in the review of upland evidence to ensure advice is based on sound evidence.</p> <p>The NFU is not in a position to provide research, but rather test the logic and provide observation.</p> <p>To that end, the NFU will be happy to engage in the review as it progresses, to discuss research findings to support your interpretation and possible future application. We will be able to support the 'ground truthing' of the research findings with some realism and provide a practical assessment of land management impact.</p>	Thank you for your offer of participation in the review process, we look forward to your input.
NFU	External factors	<p>The impact of external factors on the research findings needs to be understood before it is interpreted. External factors include headage payments (overstocking), ESA (under stocking), legislation (burning restrictions) and HLS (skewed management requirements).</p> <p>There is a need to use long term observations where possible as most ecological evidence is snapshot based.</p>	We acknowledge the importance of land managers and socio-economic circumstance in shaping on-the-ground practices. The focus of this review is ecological. Evidence based ecological conclusions will inform management recommendations that are nuanced by these important factors you have highlighted. As far as the evidence allows the externalities will be considered within the review.

Topic: Impacts of burning on peat (biodiversity and ecosystem services e.g. water quality and carbon)

Name	Reference	Comment	Natural England Response
North Pennines AONB Partnership	Suggested questions	<p>We believe that it would be useful to ask: To what extent, and in what circumstances, can cutting be a suitable alternative to burning?</p> <p>We would also welcome questions on:</p> <p>What are the impacts of cutting fire breaks on landscape quality and character, compaction erosion from cutting machines etc.?</p> <p>What is the extent and impact of heather beetle and can burning help control outbreaks?</p>	<p>All these points, though important, are considered beyond the scope of the current topic review. They relate not just to upland peatland, but also to other moorland habitats. They are all factors that are currently taken into account in managing moorland and will be considered in any subsequent wider reviews of management.</p> <p>We are also involved in other studies and work on the other topics mentioned. Cutting and other potential management techniques are being researched in a new Defra R&D project on blanket bog restoration. We are currently considering the production of a best practice guide on landscape considerations when burning moorland, and we are involved in collaborative research on post-heather beetle damage management in two areas.</p>
South West Uplands Federation (SWUF)	General comment	<p>This topic is relevant to the SW. The questions relating to this topic should address various swaling techniques and grazing. The dominance of cattle and their role following burns create very different conditions than the those of burning without cattle. The longer growing season and relatively low altitude of the SW moors must be included.</p>	<p>The review will investigate any geographical differences in the evidence. Sub-topic question 8 will specifically include consideration of any geographical differences in practices. We note, however, that upland peatlands are generally not burnt in the SW and some other parts of England.</p>
Moorland Association	Suggested question	<p>Add question – what is the effect of not burning?</p>	<p>This will be considered in reviewing the effects of burning.</p>
Moorland Association	Comment	<p>Have other factors such as acid deposition affected vegetation – why & relative importance (note – refer to original as handwriting unclear).</p>	<p>This is considered beyond the scope of the current topic, though it will be covered to some extent in the peatland restoration topic.</p>
Moorland Association	Comment	<p>What other factors affect water quality and what is the relative importance of each?</p>	<p>There is likely to be some consideration of this in addressing sub-topic question 4.</p>
RSPB	Overarching question	<p>The overarching question feels like the right question.</p> <p>Comment - It is not clear how the overarching question will apply to the extensive areas of deep peat (soil) that no longer support peat-forming vegetation (e.g. the moorland management community don't always accept that heather-dominated deep peat is still blanket bog).</p> <p>Comment - In referring to managed burning, we assume that you are also</p>	<p>As indicated in the note after the questions, it is intended that the overarching and sub-topic questions apply to modified, degraded peatlands as well as less modified habitats.</p> <p>Yes, the cumulative effects of rotational burning will be considered.</p>

		considering the cumulative impacts of repeated burning over time.	
RSPB	Sub-topic questions	Qs 1-7. OK Q8 (final question). The review should also seek to establish the extent and frequency of managed burning across the English uplands and how this overlaps with designated sites and other features of interest (e.g. peat depth, drinking water catchments).	Question revised to include these points.
RSPB	Additional question	There is an urgent need to improve our understanding of the effects of both managed burning and peatland restoration (especially re-wetting) on invertebrate abundance and diversity.	Evidence on this will be considered under sub-topic question 2.
Northumberland National Park Authority	Additional questions	Good that this review will include upland peaty soils including wet heath. Should there be a comparison with other possible management techniques such as cutting? What effect does altitude have on the recovery rate of vegetation after burning? In the current guidelines there are statements about ‘Sufficient man-power’ what is sufficient? Also consider the effect of burning on archaeology in peatlands as peat can be a significant archaeological resource in its own right and as a protector of remains.	Noted. See earlier response above. Where evidence is available on factors such as altitude it will be considered. This is not an evidence issue and is one that relates to all burning of heath/grassland habitats as well as bog. Beyond the scope of this and the other current upland topics.
NFU	Definition	Again a definition of peatlands would be welcomed. Is this different to heather/grass moorlands?	See notes after the questions. It is largely not the same as ‘heather or grass moorland’ in not including heath and grassland on mineral soils.
NFU	Additional question	A question needs to be asked to assess the confidence and strength of the evidence base.	The review will specifically be carrying this out.
IUCN UK Peatland Programme	Overarching question	This question could be improved by adding in “peatland biodiversity <u>objectives</u> ” in order to make it clear that it includes consideration of the impact of burning on objectives such as restoring blanket bog habitat. In all cases important to separate out science on heathlands on shallow peat from heath vegetation on deep peat.	Wording revised to address this.
IUCN UK Peatland Programme	Sub question 1	Good – important to include impact on <u>restoration</u> of characteristic peatland flora. Also important to consider floristic structure i.e. moss hummock hollow	Noted.

		structure.	It is intended that this is covered under structure.
IUCN UK Peatland Programme	Sub question 2	Add in consideration of effects on conservation <u>objectives</u> for fauna – e.g. to increase density or population size or productivity of breeding wading birds. Suggest rewording to include “maintenance and enhancement of characteristic fauna”	Question reworded.
IUCN UK Peatland Programme	Sub question 3	Ensure this includes consideration of the long term impacts – short term increases in sequestration may arise from growth of heather or scrub on damaged bog but this results in a long term net loss of carbon. Also separate out studies on deep peat versus shallow peat.	This will be considered.
IUCN UK Peatland Programme	Sub question 4	Ensure this includes consideration of the release of metals and other stored pollutants from damaged peatlands.	Added to question.
IUCN UK Peatland Programme	Sub question 5	Emphasise that biodiversity impacts relate to peatland biodiversity objectives (including to restore /enhance peatland spp and habitats).	This is the case for all sub-topics even though it is not spelt out in full in all questions. Reiterated in the revised note at the end.
IUCN UK Peatland Programme	Sub question 6	The interrelationship with water levels may also be important to consider. I.e. Impact of burning and grazing may be more severe where water levels are low.	Noted.
IUCN UK Peatland Programme	Sub question 7	May need to consider the different situations of degraded and wet peatland systems.	This will be considered.
IUCN UK Peatland Programme	Sub question 8	Suggest focus on deep peat area ie > 40/50cm.	These will be the major areas considered.
The Heather Trust	Overarching question	The review should also seek to establish the risks associated with not carrying out any prescribed burning.	See earlier response above.
The Heather Trust	Sub question 7	<p>The wildfire sub-topic should seek to address the link between fuel load, fire intensity and habitat damage.</p> <p>Wildfire incidents are often linked to run away fires from prescribed burning. Can the evidence for this be reviewed and the areas of wildfire arising from prescribed burning compared with the areas arising from other sources of ignition?</p> <p>In view of concerns about the damage caused by burning, some landowners favour cutting of heather. It would be useful to review the evidence of the sub-topic questions in relation to cutting to compare with the information available about managed burning.</p>	<p>A full review of wildfires is beyond the scope of the current topic, though it NE is currently reviewing its approach on the issue.</p> <p>See earlier response above.</p>

The Heather Trust	Burning and cutting	<p>The impact of burning and cutting on shallow peat soils (<0.5m deep) should also be considered. There is a lot of focus on blanket bog (which is unsatisfactorily defined as peat >0.5m deep) and the amount of carbon locked up in shallow peat is ignored.</p> <p>Evidence about how best to manage 'dry heath on deep peat' should be reviewed. This type of habitat is often found in the Peak District. It will not be possible to re-wet many areas where this habitat is found and special management is required.</p>	<p>Shallow peat habitats are included in the review.</p> <p>This is included in the review.</p>
North York Moors National Park Authority, representing all English national parks	Overarching question	The overarching question currently lacks anything about 'wildfires', although these are referred to in the penultimate question on the sub-topics in relation to managed burns. These fires, started either accidentally or by arsonists, are much less common on Dartmoor than 'managed' burns, but are still an issue and likely to become more so with Climate Change impacts on droughts and vegetation growth?	The wider scope of the relatively brief overarching question is spelt out in the sub-topic questions which include one on the relationship between managed burning and wildfires.
North York Moors National Park Authority, representing all English national parks	Overarching question	In terms of the single overarching question of the effect on upland peatland biodiversity, we feel that it would be useful to emphasise the impact on breeding birds, particular in regard to the species that require long heather to nest in. Also, to assess the impact on reptile populations given current concerns about the decline in Adder populations.	The overarching question refers to biodiversity which includes peatland habitats and associated species as specified in the note at the end and in the sub-topic questions.
North York Moors National Park Authority, representing all English national parks	Additional question	The effects of burns on already degraded peatlands would be good to highlight, although this may be at least partially covered in some of the other questions.	This is included in the review.
North York Moors National Park Authority, representing all English national parks	General point	Just a brief plea that the SW uplands are not totally ignored in the answering the questions, as the plant communities, cattle/pony grazing and lack of management for grouse make them rather different (whilst appreciating that the vast majority of the uplands are in the Pennines).	Evidence relating to the SW uplands will be considered, although it is noted that most peatlands in that region are not burned.
North York Moors National Park Authority, representing all English national parks	Representation on the group	Might it be useful to have a representative of the Yorkshire Peat Partnership on the group as they may be able to answer some of the questions that are raised in the sub-topic section?	The external experts that will join the overall assurance and topic groups have been identified and a list of them will be published shortly.
North York Moors National Park Authority, representing all English national parks	General comment	Good that this review will include upland peaty soils including wet heath as well as just blanket peat.	Noted.
North York Moors National Park Authority, representing all English national parks	New question	One omission - should there be a comparison with other possible management techniques such as cutting?	See earlier response above.

Topic: Restoration of degraded blanket bog

Name	Reference	Comment	Natural England Response
North Pennines AONB Partnership	Overarching question	<p>The overarching question does not relate to the sub-topic questions. Perhaps it should be split into 3 parts</p> <p>What management regime is needed to:</p> <ol style="list-style-type: none"> 1) Maintain active blanket bog 2) Prevent further decline of poor un active blanket bog 3) Restore blanket bog <p>The question misses other changes such as hydrology and raising the water table. If restoration to active blanket bog cannot be achieved, what are the benefits of re-vegetating to prevent further degradation/erosion?</p>	<p>Recognised that management regimes will differ according to the condition of the blanket bog and these will be covered in the review. The overarching question has been revised to reflect these points and the sub-topic questions.</p> <p>The overarching question has been revised to cover all interventions. This includes changes to hydrology. It is recognised that 'full' restoration may not always be possible, and/or over a long time period. The implications of this are covered in sub-topic question 6.</p>
Moorland Association	Suggested question	Add question as to the time scale during which any intervention will have effect.	Timescale was addressed in the original sub-topic question 3. This is now covered in sub-topic question 4.
Moorland Association	Suggested question	What factors other than management intervention affect blanket bog and the relative importance of each (note – some of the message may be lost in transcription)?	Noted. Now covered explicitly in sub-topic question 2.
Moorland Association	Suggested question	Does re-establishment of blanket bog flora affect upland species and if so, to what extent?	Noted. A number of the sub-topic questions will review the evidence of the impacts of interventions on blanket bog flora and fauna.
Moorland Association	Suggested question	How should the flora of degraded blanket bog be managed whilst restoration is attempted (note – some of the message may be lost in transcription)?	The review will consider and review all interventions and management necessary to restore a degraded blanket bog.
Moorland Association	Suggested question	How can the history(?)/scale of factors leading to apparent degradation be assessed/measured?	The review will consider all factors that may cause a blanket bog to be degraded. The changes and the timescale of these changes will also be examined.
Moorland Association	Suggested question	Is restoration of peat-forming functions likely to be affected by climate change?	The potential impacts of climate change scenarios on the restoration of degraded blanket bog and peat are outside the scope of this review.
RSPB	Overarching question	The group leading on this topic need to work to the agreed definition of active/degraded blanket bog.	Noted. There will a variety of condition (degraded and other) of blanket bog. A number of the sub-topic

		<p>As with the series of questions on burning, it is not clear how these questions will address the evidence needed to inform the restoration of areas of deep peat (no longer actively peat forming) and indeed, areas of bare peat (e.g. see Q8)</p> <p>It is hoped that the overarching question will also note the ideal management regime required to maintain active blanket bog in Favourable Conservation Status.</p>	<p>questions will review condition and describe the features of degraded bog and also those that are in good condition.</p> <p>The overarching question has been revised to more accurately reflect the sub-topic questions and areas of review. The evidence review aims to address the issues and knowledge to inform restoration measures and outcomes.</p>
RSPB	Sub-topic questions 1-3	OK	
RSPB	Sub-topic question 4	This question is a bit odd. Our starting point on this would be that any drainage is surely a bad thing for a wetland.	Drainage is likely to lead to degradation of wetland. The degree of damage will be covered under sub-topic question 2.
RSPB	Sub-topic question 5	Q5 – add ‘... and over what timescale’?	Timescale is to be addressed under the revised sub-topic question 4. Sub-topic question 5 specifically addresses the subject of ‘grip’blocking’. Timescale will also be reviewed here.
RSPB	Sub-topic question 6-7	OK	
RSPB	Sub-topic question 8	<p>Q8 – This Q would be better split into two discrete parts. The Q about restoration should surely flow from the evidence.</p> <p>Does degradation of blanket bog fundamentally change its hydrological, floristic and structural characteristics? At what point is restoration no longer feasible?</p>	This subject area is now covered under a revised sub-topic question 6. <i>‘Are there conditions where it is not feasible to completely restore a degraded blanket bog to a fully functioning bog system with its representative flora and fauna, and if so what is likely to prevent their full recovery?’</i>
RSPB	Additional question	<p>Blanket bog has been forming for millennia.</p> <p>What can we learn from the evidence base about how the state of our bogs has changed over time?</p> <p>What can we learn from the peat archive about the past history of peat formation, particularly in relation to climate?</p> <p>There is an urgent need to improve our understanding of the effects of both managed burning and peatland restoration (especially re-wetting) on invertebrate abundance and diversity</p>	<p>This is outside the scope of this particular review. However there will be some examination of peat formation in relation to climate, and also the impacts of past climate changes on peat formation.</p> <p>A number of the sub-topic questions will review the evidence on the impacts of interventions on blanket bog flora and fauna.</p>

Northumberland National Park Authority	Additional question – upland mires	Although this is stated as blanket bog, we think intermediate and raised upland mires should also be considered.	This review will specifically consider the restoration of blanket bog. It does however recognise there are other peatland habitats in the uplands which are also of environmental interest and importance.
Northumberland National Park Authority	Sub question 1	This seems the opposite of the main question, but crucial. Can the management interventions be separated with confidence as many occur together?	Noted. The review recognises that there may be difficulty in separating out impacts of different interventions. The review will identify the occasions when the evidence is not clear.
Northumberland National Park Authority	Sub question 3	What are the circumstances that make this impossible and what are the other benefits of an inactive bog (e.g. peat retention, water storage) and what management to retain these features?	This is now covered under sub-topic question 6. Although not specifically included within the question itself, it will review the value of peat protection measures where full restoration is difficult.
NFU	Additional question	The question should be asked about the ecological viability and benefit of restoration in comparison to biodiversity provided by the status quo.	This review specifically examines the restoration of degraded blanket bog with its representative bog fauna and flora.
IUCN UK Peatland Programme	Overarching question	Rather too general as there is unlikely to be a single management regime for all situations. Restoration doesn't always have to be from completely inactive state – it is important to also restore partially damaged peatlands. Need to consider net carbon i.e. sequestration and storage. Also other valuable functions water quality etc should be included. Consider fauna as well as flora. Active and inactive are not the most helpful indicators – restoration may often be required within an active peatland. Notes should also explain 'restoration' – see IUCN Inquiry definition. Suggest alternative wording: "What management interventions can restore and maintain functioning blanket bog (i.e. storing and sequestering carbon) with its characteristic <u>fauna</u> and flora, from a degraded state."	Noted and agreed. Recognise that there will a spectrum of blanket bog condition, and a number on interventions may be required. Questions have been revised to take account of many of these comments.
IUCN UK Peatland Programme	Sub question 1	There is an urgent and widely accepted need to restore peatlands and therefore the priority should be to examine the evidence that informs the restoration management rather than looking at all impacts which affect bogs. As in previous section – active/inactive is not a helpful distinction here as we need to understand management interventions needed to restore damaged blanket bogs that are still active. Suggest reworded "what management interventions improve the hydrological status on blanket bogs and what are the associated changes in peatland flora/fauna."	Sub-topic question 1 now reviews the characteristics of a 'functioning and active blanket bog'. However it is still important to understand what factors affect the above and these are now to be reviewed in sub-topic question 2.
IUCN UK Peatland Programme	Sub question 2	Perhaps broaden to what are the peat forming characteristics of different peatland plants (inc Sphagnum) an in what hydrological conditions – we know most plants	Now revised and covered in question 3. The review intends to cover the points you make.

		can form peat but some do it better than others e.g. hummock forming mosses.	
IUCN UK Peatland Programme	Sub question 3	Look at the abundance of typical peatland flora and fauna. A damaged bog may have the typical species but at a low or deteriorating level. Need to look at evidence of changes that improve the status in terms of abundance, productivity of breeding birds, population size etc. Important to examine hydrological, grazing, trampling, burning regimes.	This has now been revised and is covered under sub-topic question 4 to reflect your and others comments.
IUCN UK Peatland Programme	Sub question 4	Don't understand the need for this question.	This question has now been excluded from the review. However the impacts of drainage will be covered under question 2.
IUCN UK Peatland Programme	Sub question 5	Not sure on the wording – it's difficult to remove drains – most restoration removes their <u>effect</u> by blocking them. Restoration aims to go beyond simply <u>re-establishing</u> the characteristic flora. It also seeks to re-establish the characteristic composition and abundance of blanket bog flora. Need to consider fauna – birds, invertebrates etc as well.	Agreed and reworded in revised question 5.
IUCN UK Peatland Programme	Sub question 6	Suggest this is changed to identify interventions that maintain and enhance the composition and relative abundance of characteristic peatland species. Heather can be considered a peat forming species but is damaging to a blanket bog if it becomes dominant over the moss species.	This partly duplicates the review subject area under the original question 3. Questions 3 and 6 have now been amalgamated into a revised question 4. Peat forming species are to addressed under question 3.
IUCN UK Peatland Programme	Sub question 7	Suggest reword to examine the relationship between peatland vegetation composition, water level and greenhouse gas flux. Peat accretion alone does not address methane emissions. Also we need evidence on different states of restoration not simply between the extreme states of a non peat forming bog and a peat forming one.	The first part of this comment is to be addressed under new sub-topic question 7. Agreed that there are many states of condition of blanket bog. The review recognises this and understands that different interventions and degrees of intervention will need to be examined.
IUCN UK Peatland Programme	Sub question 8	Perhaps better to have a question that examines the evidence for management interventions that improve an extremely degraded system towards functioning peatland with its characteristic species (<u>fauna</u> and <u>flora</u>) component. Important to recognise that restoration in extremely damaged areas doesn't immediately bring back bog function and species but can stop the system deteriorating further losing more stored carbon etc.	Noted. This is now covered in a revised sub-topic question 6.
The Heather Trust	Definition	Do we need to define a blanket bog? Should this be flexible to incorporate blanket peat of shallower depths	Noted. This will now be covered in a revised sub-topic question 1 which intends to examine peat depth.
The Heather Trust	Additional question -	Is there any evidence to how bogs should be managed while rewetting takes place, before they reach a new stable position? This could take many years and	All forms of intervention will be reviewed, both their role in shorter and longer term. Timescale is an

	rewetting	management might be necessary to protect the bog vegetation during this period.	important factor that will be covered throughout but specifically in the revised question 4.
The Heather Trust	Additional question – management of deep peat	What evidence is there to provide guidance about how to manage deep peat that is not suitable for restoration?	Noted. If the review identifies situations where full restoration is not possible then alternative protection measures may be appropriate. This subject area is now covered in a revised question 6.
The Heather Trust	General	<p>Can discussion of peatland restoration be kept separate from the economic issues, e.g.</p> <ul style="list-style-type: none"> • What incentives will be available to encourage land managers to carry out any restoration work? • What could be the role of the private sector in funding restoration through CSR payments or carbon trading? 	While an important comment and subject area, economic issues are not within the scope of this review.

Topic: Impacts of track construction (including temporary structures and matting)

Name	Reference	Comment	Natural England Response
National Sheep Association	Proposed new question/ general comment	Questions appear to assume a track is a track – but there are many types of tracks and many different uses. It may be reasonable to ask what track usage is damaging (and even positive given that appropriate tracks and usage might lead to better shepherding which might improve habitats etc). Also are you talking about made up tracks that may or may not be drained, or tracks that are made by walkers/bikers/ and or horse users. Is a quad damaging or any more damaging than walkers and horse riders?	Track in this case refers to the creation of a new vehicle route across blanket bog.
North Pennines AONB Partnership	General comment	How do we deal with plan for the incremental effect and impact of many small tracks being built all over the landscape (the 'death by 1000 cuts issue')? Are there suitable alternatives to stone tracks on blanket bog? We are currently running a project for NE which is looking into this)	An important point that needs to be addressed but is not part of an evidence review. It is hoped that some information can be presented in an appendix to provide context for decision making etc. It is intended that alternatives will be considered as part of the review.
North Pennines AONB Partnership	Question specific comments	The questions do not tackle the following issues: What are the impacts of non stone tracks on peatlands? What is the extent and effect of vehicles travelling over un-surfaced routes? Should some areas of peatlands be 'no track zones' in order to maintain their 'relative wildness', landscape character, tranquillity etc? We would recommend that these questions are asked.	It is intended that some elements of this will be assessed as part of the review e.g. vehicle use across peatland. "No track areas" are a policy issue and not part of the evidence review.
Moorland Association	Suggested question	Add question as to benefit of tracks in preventing damage from vehicles and walkers.	This will not be specifically addressed although the findings may indicate lines of further investigation.
Moorland Association	comment	Is it possible to design/construct tracks that don't cause damage to peat?	It is intended that this question will be answered as part of the review.
Moorland Association	comment	Are there circumstances where tracks are necessary for management functions?	This is outside the scope of the review.
Moorland Association	comment	What sets of tracks do these questions assume? (note– refer to original, handwriting unclear)	This review covers new tracks on peatland for vehicle use.

RSPB	General	<p>Whilst we appreciate that the evidence base may be rather scant, with respect to tracks, the series of questions are rather limited.</p> <p>In particular, there may be a need to consider differences between tracks that have been constructed (with associated drainage, bridges, addition of minerals (especially limestone) etc) with the direct use of vehicles across a bare, unprotected bog surface. This hints at a difference in use of vehicles (e.g. repeated use) and also the impacts of frequent use (e.g. repeated use of a track may not make any difference – whereas repeated use across unprotected bog surface may be highly significant).</p>	It is intended that types of vehicle and frequency of use will be included within the review.
RSPB	Additional	How does vehicle use (across an unprotected bog surface) impact on blanket bog vegetation and the hydrological state of the bog?	It is intended that this will be included within the review.
Northumberland National Park Authority	Moorland Tracks Project	NNPA is due to initiate a moorland tracks project which is at the development stage. If there are questions that could be addressed or methodology that could be tested we would like to assist with this.	Thanks you. Gaps in evidence will be identified which provide avenues for further research.
Northumberland National Park Authority	General	<p>We wonder whether all these questions should only refer to tracks on blanket peat or tracks on all carbon-rich upland soils.</p> <p>Questions should ask about potential solutions as well as finding out about the issues.</p>	Due to the time constraints and the priority the review will have to focus upon blanket bog.
Northumberland National Park Authority	Additional question	How is drainage/surface water dealt with when constructing a track and how does this affect the surrounding peat and soils? Do upland tracks on peat or mineral lead to deterioration in water quality locally and further down the catchment?	It is intended that this will be included within the review.
Northumberland National Park Authority	Sub question 3	Do tracks lead to enhanced erosion of blanket peat? And does continual driving without track construction lead to similar or different results? Do different types of track formation and use e.g. foot, quad, Argocat have different impacts?	It is intended that this will be included within the review.
Northumberland National Park Authority	Additional question	<p>What methods and materials are used to construct moorland tracks?</p> <p>and how do these affect the surrounding vegetation?</p>	It is intended that this will be included within the review.
Northumberland National Park Authority	Additional question	How can tracks that are causing erosion be managed and restored to prevent further degradation. What are the best techniques, what do they cost, how long do they take?	Restoration is beyond the scope of this review.
Northumberland National Park Authority	Additional question	There is an issue about increasing number of tracks in an area and the effect of these tracks per se, as well as the knock-on increase in access and more intensive management that can occur if they are there.	These are important points which need to be captured within discussion regarding track development but are out-with the scope of this review.

		Is it preferable to have a network of fewer tracks that are managed to maintain a travelling surface rather than many, ever widening tracks that are not managed?	
Northumberland National Park Authority	Additional question	Are there additional land management benefits of managed tracks e.g. acting as fire breaks	This is beyond the scope of this review.
NFU	Definitions	Natural England need to define 'track'. Is it a vehicular or sheep track or something else? The section switches between blanket bog and peat bog, causing confusion. Natural England need to define both to structure the review. You would not expect to find track on or next to blanket bog.	The type of track and peatland will be defined.
The Heather Trust	Additional question	What evidence is there about the best design for tracks to minimise their impact on upland vegetation?	This is outside the scope of the review.
The Heather Trust	Additional question	Has any research been carried out on the effectiveness of track matting materials for light traffic as an alternative to more invasive and permanent track construction techniques?	It is intended that this will be included within the review.
The Heather Trust	Additional question	If it is accepted that some tracks are a requirement for effective management and monitoring, what evidence exists about how they should be designed and managed to mitigate their impact?	This is outside the scope of the review.
The Heather Trust	Additional question	Has any attempt been made to categorise tracks to meet the requirements of quad bikes / ATVs, 4x4 vehicles, or heavier traffic? The use will affect the design and maintenance requirements?	It is intended that this will be included within the review.

Topic: Moorland grazing and stocking rates

Name	Reference	Comment	Natural England Response
National Sheep Association	Proposed new question	Given the Government's upland strategy (and I understand that NE remit is environment and biodiversity) it might be worth asking a question(s) about the importance of 'holism' in upland management, something about the value of ensuring uplands contribute to all public goods, but concentrate on those most appropriate. Recognition of the role that upland farming plays in feeding	The review is intended to take account of moorland ecosystem service provision other than biodiversity. This may not be quite as wide as this proposal, but the scope of the current review will not consider more

		people, and supporting farming systems in lowlands that feed people, would help to get more of the farming community interested in holism, and more of the conservation community interested in sustainable farming.	socio-economic areas.
National Sheep Association	Proposed new question	It would be useful to add a question – What are the effects of an absence of grazing on moorland ecosystem services?	A question covering absence or removal of grazing has been added.
National Sheep Association	Proposed new question	Add – What shepherding techniques lead to improvements in habitat and ecosystems services?	Shepherding has been added to the question on spatial pattern of grazing, and how this can be influenced.
National Sheep Association	Sub-topic question 5	Do low intensity regimes deliver floristic changes that lead to restoration, or a decline in quality, of small areas of priority habitat that are part of a moorland mosaic?	Small but valuable areas of habitat are often degraded due to large edge effect. This question is about whether these areas can be restored without significant adverse effects elsewhere.
South West Uplands Federation (SWUF)	Impact of local conditions	This topic is of particular relevance to the SW. The various combinations of different types of livestock (cattle, sheep and ponies) create different vegetation management. Local conditions enable or prevent such combinations. The impact of these, often subtle local conditions, must be addressed. The economics of keeping stock on the hills is a very critical question.	Geographical variation and differences between areas is implicit in the review. Where evidence exists of differences between areas or particular effects in certain areas it should come out in the review. There is a question on differences in livestock type and breed.
Moorland Association	General	The questions don't address the problem of implementing grazing regimes and the consequences of localised overgrazing.	This is a socio-economic question and as such outside the scope of the current review, although localised overgrazing may be addressed to some extent in the evidence gathering for some of the sub-topic questions. The issue of implementation may be something to be considered as part of the response to the review.
Moorland Association	Manpower/grazing regimes	The questions should address issue of availability of manpower to effect desired grazing regimes. (warning refer to original – handwriting unclear).	This is a socio-economic question and as such outside the scope of the current review. The issue of manpower may be something to be considered as part of the response to the review.
RSPB	Overarching question	The overarching questions look about right.	Has been simplified slightly, but without altering scope.
RSPB	Sub-topic question 1	Thinking around optimum prescriptions for upland biodiversity could include some thought around whether there is any benefit in having periodic pulses of grazing for some upland biodiversity. This might be useful in managing	Expanded sub-topic Q1 to make it clear that the scope covers a range of parameters of grazing, including timing and frequency.

		moorland edge, tree regeneration etc.	
RSPB	Sub-topic question 2	Must also consider the seasonality of grazing as well as the total annual stocking density and type. For example, the number of stock over-wintered on unenclosed hill land may have a disproportionate impact on the vegetation.	Seasonality is covered in sub-topic Q1, and effects of changes in seasonality including reduced over-wintering. On-going or heavy over-wintering will be the comparator to this so should be included.
RSPB	Sub-topic question 6	There is some overlap in this question with the way burning is undertaken. Note – there is also a much wider angle to this question. Will the review consider wider policy constraints that impact on aspects such as flexibility in farming system, type of livestock available, levels of support available?	The question now explicitly asks about interactions between grazing and burning. Second part is outside scope of current review, but likely to be considered in follow up and response to review.
RSPB	Sub-topic question 7	Q7 – Particularly interested here in scrutiny of the evidence to inform understanding of the impacts (+/-) of sheep, cattle, ponies etc.	Noted. Question has been expanded to make it clear it covers species, breeds and combinations of grazing animals.
RSPB	Additional question	Is it worth thinking about the ideal grazing prescriptions assuming we have only sheep or a mix of sheep and cattle available? Sheep (only) likely to remain as the main choice of grazing animal for the foreseeable future. Are there any other management interventions (e.g. cutting rides, changing the timing of introducing/removing sheep, even the breed of sheep) that might improve the ability to manage uplands with sheep?	This is implicit in existing questions. As many systems are sheep-based, existing good practice should be picked up.
Northumberland National Park Authority	Sub-topic question 6	The sub-topic question on spatial grazing should include investigation into shepherding, including time, number of people, regularity. Also the effect of burning on spatial grazing. Investigating the type of grazing animal is important.	Question more explicitly covers grazing and burning, and should identify best practice for environmental outcomes.
NFU	Overarching question	The overarching question is very broad and it will be impossible to find a simple answer as all sites vary. There is a lot of available evidence in this area for review. Has there been evidence gathered from the ESAs that can be applied here?	This question is broad with the sub-topic questions looking at the detail. Where evidence exists the review will take account of geographical and environmental factors that influence outcomes. ESA monitoring data and reports will be considered.
NFU	Stocking rates	Improving the evidence on the impact of stocking rates to provide good evidenced justifications for the rates prescribed would be welcomed. This should explore a broader range of stocking rates and their impact.	Noted. A key part of the review for this topic.
The Heather Trust	Additional question	Is there a better way to control grazing management than by using stocking rates, which tend to be very inflexible – the ‘one size fits all’ approach takes insufficient account of the variability of the ground, different seasons and the	Question has been expanded to collect evidence of whatever methods are used to set grazing regimes. Current approach to setting stocking rates, which

		needs of the farm. Outcome led management would place responsibility on the land manager to achieve the required management objectives and might be a more effective way to manage moorland grazing.	includes taking account of different vegetation types, will be examined.
The Heather Trust	Comment 3	The system described in Comment 3 is very prescriptive, very bureaucratic, very difficult to monitor and possibly very ineffective.	The review will consider the question of effectiveness, and identify any alternative approaches.
The Heather Trust	Additional question	What are the impacts of domestic stock reductions on wild graziers?	Not within the scope of this review. Noted as a topic for a future review.
The Heather Trust	General	Are there options to remove the blanket ban that exists in some areas on winter grazing introduced to avoid the risk of overgrazing? For example, on Exmoor there are concerns that the ban has resulted in the significant expansion of European Gorse, that previously had been grazed by browsing cattle during the winter.	The review addresses changes in seasonality of grazing regimes and will pick up evidence of resulting significant change.
UTASS	General	A lot of talk about "restoration": to what? Where is the baseline survey to show what was there 10 years ago let alone 50, 100 or even further back?	Restoration to, or toward, favorable condition, and/ or habitat attributes required to maintain and expand populations of key species.
UTASS	General	The effects on summer grazing patterns where there is winter removal (destruction of hefting)	Evidence could come out in sub topic questions 3 and 6. However partly a farming systems question outside of scope of current review.
UTASS	General	The reduction in nutrients through reduction in grazing numbers.	Not a concern in semi-natural moorland habitats subject to atmospheric N deposition. The review should pick up evidence of change, positive or negative, in moorland vegetation.
UTASS	General	The effects on other habitats through winter removals: where does the displaced stock go?	This is a farming systems question outside scope of current review. It will be necessary to consider implications of review findings for farming systems and policy measures.

Topic: Hay meadow management

Name	Reference	Comment	Natural England Response
North Pennines AONB Partnership	General comment	We are currently working on a comprehensive report for Natural England in relation to the long term trends in upland hay meadow communities in the North Pennines (where 40% of the UK's species rich upland hay meadows are found). This report will provide important information and analysis that should feed directly into the Evidence Review process and we will forward it to you in mid May. The questions you pose in this review will also be addressed in our report as far as is possible.	Noted. We look forward to receiving the report.
North Pennines AONB Partnership	Definition of 'species-rich'	We think a key issue will be how the term 'species-rich' is interpreted. By this we mean a 'proper' MG3 meadow with all the characteristic and special species (wood crane's-bill, globeflower, great burnet, melancholy thistle, knapweed etc). Unfortunately, Natural England may regard a species-rich meadow as one that contains more common (but characteristic) species like yellow rattle, red clover, pignut and eyebright. This will be a critical issue in driving what management is, or isn't, acceptable.	Interpretation and definitions of the habitat are covered in the definitions section attached to the questions.
North Pennines AONB Partnership		The needs of ground-nesting birds must be considered in relation to the time of nutrient and lime application, rolling, harrowing and other mechanical operations in upland hay meadows.	Noted – questions modified to ensure this topic is covered.
North Pennines AONB Partnership		When considering stocking densities in relation to moorland grazing, whole farm units should be considered, as removal of livestock from moorland can result in higher stocking (potentially overstocking) on enclosed land. There would be value in raising the issue through a specific question about sustainable management of whole farm units in the uplands.	Noted – will be picked up by other Uplands Evidence review topics e.g. moorland grazing and stocking rates.
North Pennines AONB Partnership	Proposed change to overarching question	The overarching (and subsequent) questions only refer to maintaining species richness. The data that we have gathered in the North Pennines and our analysis of records from the early days of the ESA scheme show that the quality of our meadows has been steadily declining over recent years/decades, with a steady loss of the most characteristic plants associated with MG3 upland hay meadows. We believe that NE should really be focussing on identifying farm management which halts the decline in floristic diversity and then acts to reverse the decline (by facilitating an increase in species richness). By adding seed from adjacent (or very local) donor meadows as we have been	The questions will consider maintenance and restoration to favourable condition (rehabilitation) but not restoration from semi-improved grassland to the upland meadow priority habitat. Much is now known about techniques for the latter but the topic is not considered a priority for this evidence review.

		<p>doing here in recent years we have been tackling an important aspect of reversing the decline but this <u>will not work</u> if other aspects of farm management are not right (eg. too much fertiliser or too heavy spring grazing).</p> <p>The overarching question could therefore be re-written as: "What constitutes a sustainable management regime for <i>halting and reversing the decline in the floristic diversity of the upland hay meadow Priority Habitat</i> whilst ensuring they remain an integral part of upland farming systems?" (our changes in italics)</p>	
North Pennines AONB Partnership	Proposed change to sub topic question 1 (linked to overarching comment above)	"What types, rates of application and timing/periodicity of nutrient and lime applications maintain the floristic diversity of <i>species-rich</i> upland hay meadows and what types, rates of application and timing/periodicity of nutrient and lime applications enable the recovery of upland hay meadows which are declining in species richness?"	The questions will consider maintenance and restoration to favourable condition (rehabilitation) but not restoration from semi-improved grassland to the upland meadow priority habitat. Much is now known about techniques for the latter but the topic is not considered a priority for this evidence review.
North Pennines AONB Partnership	Proposed change to sub topic question 3 (linked to overarching comment above)	"What spring grazing levels, <i>livestock types</i> , timing of shut up/closure for hay and cutting dates maintain the floristic diversity of <i>species-rich</i> upland hay meadows and what spring grazing levels, <i>livestock types</i> , timing of shut up/closure for hay and cutting dates enable the recovery of upland hay meadows which are declining in species richness?"	The questions will consider maintenance and restoration to favourable condition (rehabilitation) but not restoration from semi-improved grassland to the upland meadow priority habitat. Much is now known about techniques for the latter but the topic is not considered a high priority for this evidence review.
RSPB Senior Uplands Policy Officer	Overarching question	The set of questions on upland hay meadows is welcome. It is unclear, if the review will also consider the evidence to underpin the wider management of upland pastures, some of which are of importance for a suite breeding (e.g. lapwing, redshank, yellow wagtail) and feeding birds (e.g. lapwing, curlew, golden plover, black grouse) and other flora and fauna.	Noted – issue of upland pastures will be picked up by other Uplands Evidence Review topics e.g. moorland grazing and stocking rates.
Northumberland National Park Authority	Restoration of hay meadows	As well as considering maintaining diversity, the investigation should consider regimes for restoring hay meadows that have lost diversity.	The questions will consider maintenance and restoration to favourable condition (rehabilitation) but not restoration from semi-improved grassland to the upland meadow priority habitat. Much is now known about techniques for the latter but the topic is not considered a high priority for this evidence review.
Northumberland National Park Authority	Sub question 1	How does this vary if trying to restore diversity rather than maintain	The questions will consider maintenance and restoration to favourable condition (rehabilitation) but not restoration from semi-improved grassland to the upland meadow priority habitat. Much is now known about techniques for the latter but the topic is not considered a high priority for

			this evidence review.
Northumberland National Park Authority	Sub question 2	Why just rushes? - thistles, docks etc also. Also should have some reference to rolling, harrowing, drainage and other management of hay meadows.	Rushes are the most contentious and intractable issue. The other issues (other weed control, harrowing/rolling) are not usually problematical and are allowed/accommodated for in HLS prescriptions etc.
Northumberland National Park Authority	Sub question 3	Some reference to the type of animal used for grazing. Horses, sheep and cattle will vary and can make a difference.	Noted – topic will be picked up in the review but mostly it is the way the livestock are managed that matters rather than the livestock “species”.
NFU	Sub question 1	It is encouraging to note the review includes the active management, through us of inputs, of hay meadows. There is anecdotal evidence that biodiversity has suffered with a ‘no input’ policy leading to, in part, due to lack of lime.	Noted – liming will be considered but HLS now takes a more positive view of liming than in the former classic schemes where a derogation was required.
NFU	Sub question 2	Sub question two needs to cover both management approaches of chemical and cultivation to rush control. Practical evidence seems to indicate that 80% effective rush control can be achieved by chemical means. Cultivation methods appear not to have an impact.	Noted – all forms of rush control and management will be covered in the review.
NFU	Sub question 3	The question needs to cover soil types, drainage, and local micro-climate. It needs to be realistic in that one answer will not be appropriate to all types and locations of hay meadows.	Noted – the review will cover this geographical variation in soils, climate etc issue but see no need to specifically mention this in the specific question.
NFU	General - Species mix	There is no mention of species mix in the hay meadow and the need to produce a suitable hay crop (quantity and quality) from the field. For example, white clover may be seen as inappropriate in the floristic mix, but for the farm it is a valuable source of fodder protein, a nitrogen soil fixer and supports bees.	The issue of floristic composition of hay meadows and its relationship to management factors such as hay cropping (including quality/quantity) will be covered in the review.
UTASS	General	What constitutes a sustainable crop? Should it be sufficient in quantity and quality to maintain the 4 legged lawn mowers needed to manage the vegetation height on the rest of the farm?	Question wording modified to ensure focus on the management regime that delivers biodiversity outcomes. However, the importance of agricultural management and the maintenance of upland farming systems to the maintenance of hay meadow biodiversity will be considered.
UTASS	General	Influence of altitude, climate and soil type on nutrient levels especially in a short growing season with a long active leeching period.	Noted – the review will cover this geographical variation in soils, climate etc issue but see no need to specifically mention this in the specific question.

UTASS	General	Agree with the rush scope.	Noted